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AUGUST 1946

Materials Handling Do's and Don'ts

The Facts on "Shelf Curing of Cheese

Statistical Control Of Production

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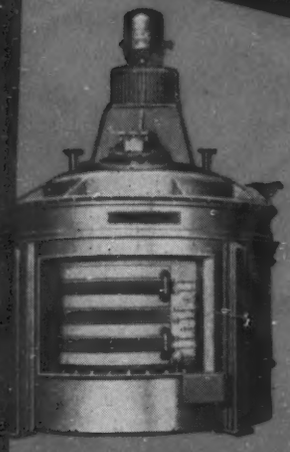

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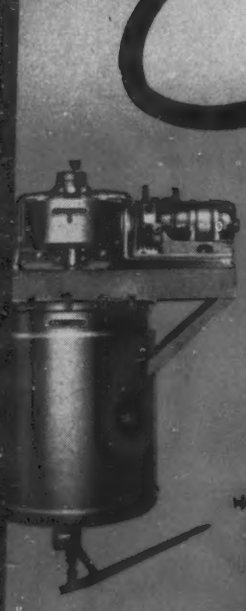

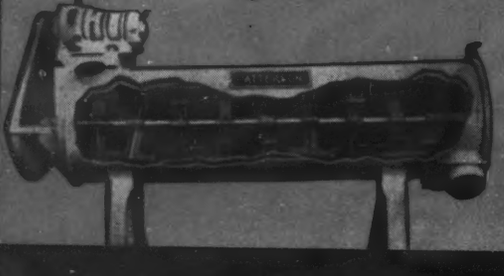

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AUGUST, 1946 Volume 18, Number 8

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THE COVER

Ice cream portions are cut from large slabs, machine-wrapped in parchment paper, and then placed in small cartons. Wooden spoons are included. This picture shows the operation at Abbotts Dairies, Inc., Philadelphia.

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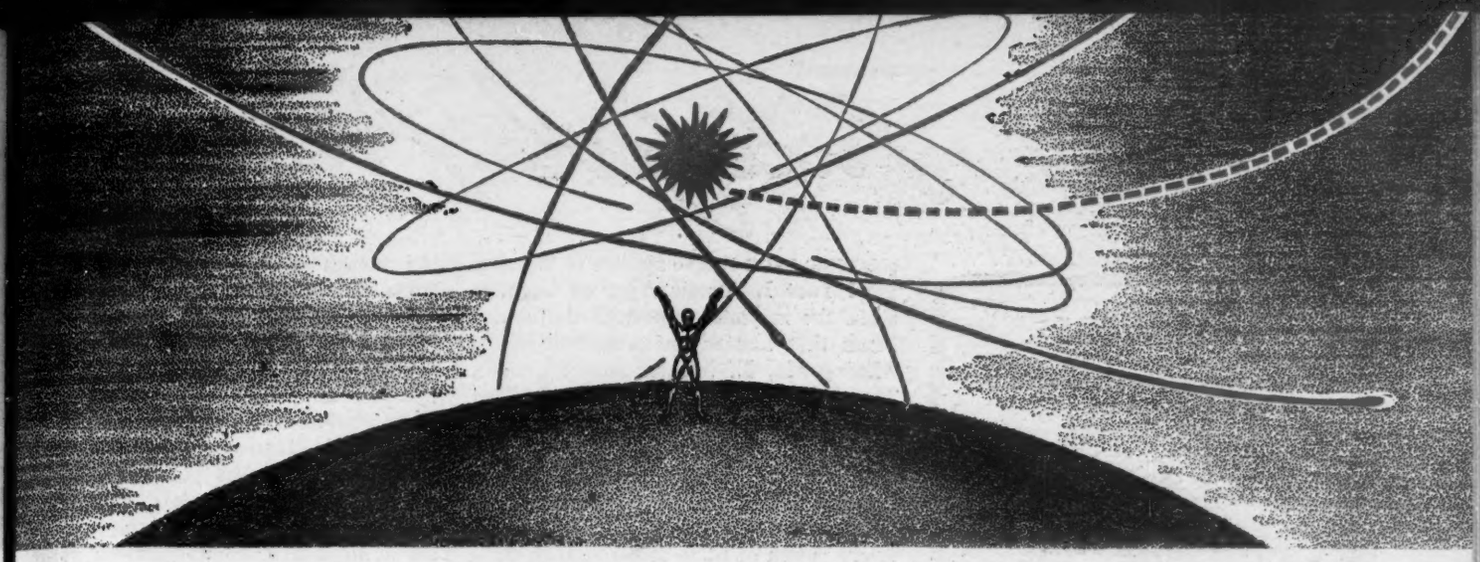

MAN vs ATOM—YEAR 1

WHEREIN WE SIGNALIZE THE FIRST ANNIVERSARY OF THE ATOMIC AGE, CONSIDER THE ALTERNATIVES INHERENT IN BOTH GOOD AND EVIL POTENTIALITIES OF NUCLEAR FISSION, THEN VENTURE A GLIMPSE INTO THE FUTURE

A YEAR AGO, July 16, 1945, at Alamogordo, New Mexico, man created the first atomic explosion. Most impressive events diminish in stature as they recede in time. This one grows bigger with each passing day. It truly marked the beginning of a new age.

As Year 1 of the Atomic Age ends and Year 2 begins, we are engaged in three portentous projects.

At Bikini Atoll we are detonating the fourth and, possibly, the fifth atomic explosions in the history of the world.

At Oak Ridge, Tennessee, we are building the first atomic energy plant for peaceful purposes.

Most important, in New York we and all the other United Nations are engaged in the first attempt to subject atomic energy to international control. Literally, the fate of the world hangs on this attempt.

As this introduction is written, the United Nations Atomic Energy Commission has just begun its work. People everywhere pray for its success—for their own sake, but even more for their children and for their grandchildren. If this Commission fails let everyone everywhere be warned: the world has taken a step toward destruction.

As we enter the second year of the Atomic Age, the nations of the earth are embarked on an atomic armaments race. There is no blinking that fact. We have had official notice served on us. Therefore, we must understand that unless the United Nations Commission can arrest the drift of events, we are moving toward a horrible war. The Commission must succeed.

The American delegate, Mr. Baruch, has brought to the Commission an ably thought out plan. It would internationalize nuclear science, and release for mankind the beneficent applications of atomic energy. But it would "control" atomic bombs only to the extent of giving the world brief warning of any nation's preparation to use them, so that we might have foreknowledge of disaster.

Therefore, the real and enormous task before the world becomes clear. We must end war. No other control of atomic weapons exists. If war comes, atomic weapons will be used. If they are used, our children who survive will curse their fathers. Understanding the consequences of failure, we *must* succeed.

Because we cannot succeed without knowledge, I have asked my associates at McGraw-Hill to condense into the following pages what we know at the close of Year 1 about this great new atomic force — its basic science, its possible uses and its political repercussions.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Co., Inc.

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This Fateful Atom...

LOOKING BACK twelve months to the birth of Year 1, Atomic Age, we begin to sense the majestic import of the atomic bomb that blasted the naked desert at Alamogordo, N. M., on July 16, 1945. There man first shattered atoms in an explosive *fast-chain* reaction. Then came Hiroshima and Nagasaki.

In every case the fateful atom was either uranium 235 (U235), or plutonium derived from the action of U235 on U238. Every pound of U235 atoms split in these unprecedented blasts yielded the energy of 11.4 million kilowatt-hours, or 1400 tons of coal — slightly more for plutonium.

No matter where one mines uranium ore, the purified natural uranium (Fig. 1) always contains 99.3% of the "garden" variety U238, and a mere 0.7% of the precious U235.

An atom is like our solar system. The central sun is the nucleus — a bunched mass of protons and neutrons, each weighing one unit. The planets are electrons. Each proton has one plus electrical charge — each electron an equal negative charge. There must be as many negative electron planets as positive protons in the nucleus. This is also the "number" of the atom. Neutrons have no charge, but add weight.

The atomic number of uranium is 92 because the uranium atom always has 92 nuclear protons and 92 electron planets. The isotopes U238 and U235 differ only in the number of neutrons; U238 has 146 neutrons, and weighs 92 + 146 = 238 units. U235 has 143 neutrons, and weighs 92 + 143 = 235 units.

Ordinary chemical reactions, such as TNT explosions, release only a fraction of the modest energy of the whirling electrons in the outer atom. Nuclear reactions unlock the immensely greater energies which bind together the nucleus.

Even the gentle tap of a slow-moving neutron bullet will split the atom of U235 or of man-made plutonium into two medium-weight atoms, yielding also one to three spare neutrons plus energy. Thus these *fissionable* materials supply both their own bullets and a highly sensitive lot of high-explosive targets — a perfect setup for a *chain reaction* (Fig. 2).

Chain reactions work like chain letters. Neutrons from one nuclear explosion hit and explode other nuclei. But, since atoms are mostly open spaces a chain started in a small block of U235 or plutonium quickly dies out because most of the released neutrons escape from the block.

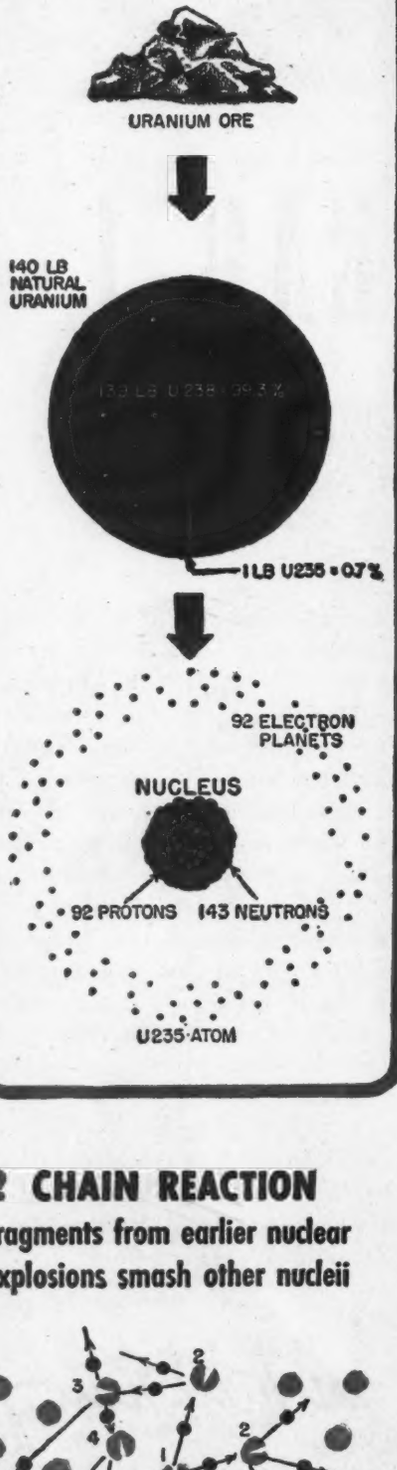
The bigger the block, the smaller will be the percentage of escaping neutrons, and the more left to split other nuclei. When the block is rapidly built up beyond a certain secret size the fragments of 1000 nuclear fissions split many more than 1000 additional nuclei. Then fissions multiply geometrically, and the block disintegrates with explosive speed and violence — as in a bomb (Fig. 3).

This bomb explosion is a fast-neutron chain. For economy and ease of control, uranium piles for the gradual release of nuclear energy for commercial purposes will normally use a lean fuel — that is U235 or plutonium diluted with U238, thorium or other less costly materials.

To maintain a chain reaction such piles must be large and artificially stimulated by using carbon blocks or some other *moderator* (Fig. 4) to slow many of the neutrons. Slow neutrons make more hits than fast neutrons because there is more time for them to be swerved from a straight path by the attraction of nearby nuclei, as shown below.

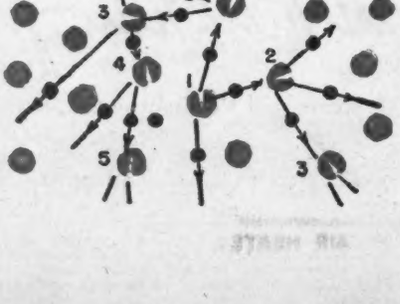
1 ORE TO U235

Only 0.7% of natural uranium is U235



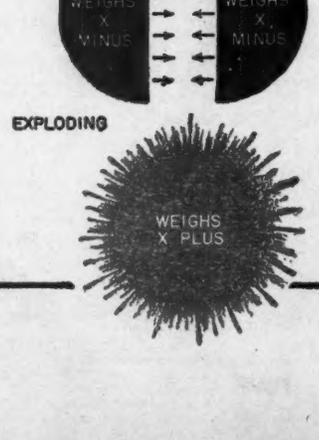
2 CHAIN REACTION

Fragments from earlier nuclear explosions smash other nucleii



3 WHY BOMB EXPLODES

When block of rapidly assembled U235 passes secret critical size it explodes spontaneously



4 SLOW NEUTRONS MAKE MORE HITS

A slow neutron is more easily swerved from a straight line

... can Serve Man ...

THE FATEFUL U235 ATOM can serve man as a new, compact source of heat energy for power generation, comfort heating or industrial processing. Peacetime applications of atomic energy will use dilute U235 or plutonium as a "fuel," mixed with carbon or some other moderator to slow some of the neutrons and thus keep the chain reaction going.

The diluting agent may be either U238 or thorium, or both. These will do double duty, because neutron bullets convert U238 into the energy-yielding plutonium, and thorium into U233, which may prove equally serviceable.

Thus the commercial piles of the future will "burn" U235 to make other atomic fuels, plutonium and possibly U233, which in turn will deliver heat energy to the pile. In that way it will be possible to get from the pile far more heat than the equivalent of 1400 tons of coal for each pound of U235 split. This highly attractive prospect will speed the day when nuclear energy can compete with coal.

While already mechanically obsolete, the piles making plutonium for bombs at Hanford, Wash. (Fig. 1) reveal the basic principle on which future piles for power and heat will operate. The heat now wasted in vast quantities will be put to work. The plutonium, now removed for bomb manufacture, will be returned to the pile (or left in) as supplementary fuel.

ATOMIC POWER

The possible everyday applications of nuclear heat pictured in Fig. 2 have been recognized from the very first day of the Atomic Age. Year 2 will see the building of the world's first atomic power plant (a pilot plant) at Oak Ridge, Tenn.

Beyond question such installations will produce power, but it may be years or decades before they prove economical. To compete with conventional plants the piles must first be redesigned to run at temperatures high enough for good power-plant efficiency. Also the techniques of operating piles by remote control through the heavy radiation screens must be radically streamlined.

The Hanford piles run on natural uranium containing only 0.7% of U235. The typical commercial atomic power plant of the future will use more than 0.7% of U235 or plutonium, but less than 50%. This will avoid both the low efficiency of the too-lean mixture and the excessive fuel cost of the rich mixture. It will permit piles of moderate size and take maximum advantage of U238 and thorium as potential sources of plutonium and U233.

One should not expect U235 to replace coal generally in this generation, although a few central power stations and ships will try it out before Year 10 of the Atomic Age. Plants far from traditional sources of fuels may turn much sooner to uranium and thorium as concentrated heat sources, that may easily be transported even to remote corners of the earth.

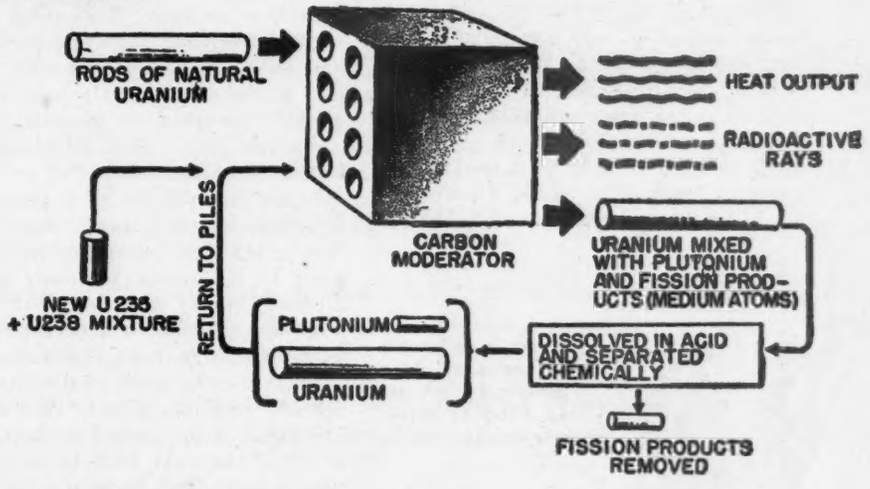
Atomic power, in forms now known, is impracticable for automobiles and small airplanes, because of the large initial investment in uranium and the need to carry 50 tons of shielding to protect riders and pedestrians against the deadly radioactivity accompanying nuclear fission.

RADIOACTIVE ISOTOPES

More immediately important than the heat and power applications of nuclear energy are the services that the radioactive byproducts of pile operation can render. Because these materials act chemically like their ordinary non-radioactive cousins, but can be followed and detected easily, they are expected to play tremendously vital parts in medicine and biology. For more details, see the last page of this section.

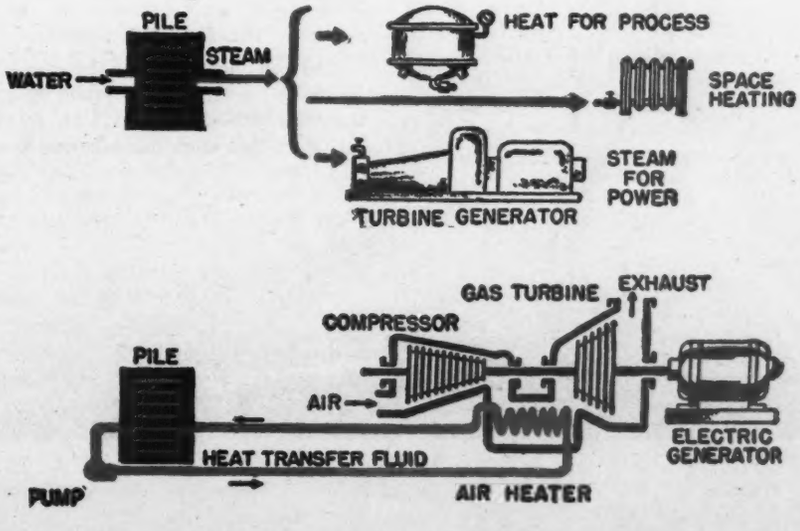
1 SLOW-NEUTRON PILE

Can make plutonium for bombs—or heat for power, process and comfort

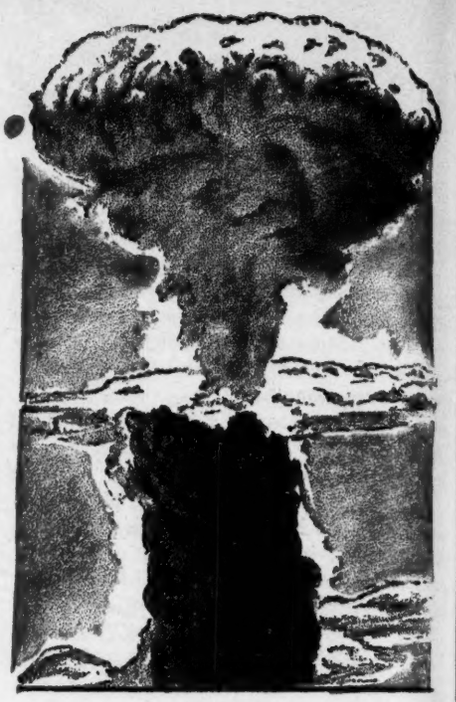


2 PRACTICAL APPLICATIONS

Include steam for turbines, process and comfort heating—also heat for gas turbines



or Destroy him . . .



A single improved atomic bomb can devastate ten square miles of city

URANIUM 235 and plutonium are now man's slaves. They will build or destroy as he orders. Man dreads this vast force only because he distrusts himself. War is proof that man in the mass has never achieved self-control. He has always sought better weapons; yet the perfect weapon now brings him no satisfaction for he sees in the atom bomb his own destruction as well as that of his enemy.

The ultimate benefits of nuclear energy may well surpass its present terrors, but the terrors are here now in awful dimension, and man must face them. He must pay this price for unlocking the wealth of the inner atom.

ATOMIC BOMB

This page, then, is about the atomic bomb. Nothing will be said here that is not either a certified scientific fact or a conclusion shared by the majority of the leading scientists, engineers and statesmen who have studied the matter.

As already explained, an explosive nuclear chain reaction spontaneously sweeps through a block of U235 or plutonium when the block is rapidly enlarged beyond a certain "critical" weight X. That weight is still a military secret; the official Smyth report vaguely suggests that it is more than 4 lb and less than 200 lb. Each piece of U235 in the dormant bomb must weigh less than X. At the desired instant of explosion the bomb mechanism assembles these pieces rapidly into a single piece considerably heavier than X.

The explosion itself drives the U235 pieces apart, thereby quenching the atomic conflagration before all the atoms are split, so the bomb efficiency is far less than 100%. For each pound of U235 (or plutonium) atoms actually split, the bomb releases the energy of 1400 tons of coal.

This explosion is mainly ordinary heat at work in unprecedented concentration. Bomb metals become incandescent vapor millions of degrees hot. This, and the enveloping sphere of glowing air, radiate a blinding flash that chars human flesh at half a mile and blisters at over a mile. There is a destructive shock wave (sound) and a second-long hurricane of unimaginable force — the outrushing of the expanding heated air. Deadly neutrons and gamma rays speed out from the bomb.

A single atomic bomb killed about 100,000 at Hiroshima. Fewer died at Nagasaki only because the circle of potential destruction included much vacant land. Bombs ten times more powerful can be made by the thousands in any major industrial country with the plants and the know-how. One bomb could saturate Minneapolis or downtown Manhattan.

Many experts estimate that a complete set of American atomic "secrets" and blueprints might save a foreign power two to three years at best in its race for atomic arms. With no help at all from us, any advanced industrial nation can, in five to ten years, acquire the raw materials, the plants, the know-how and enough bombs to knock out the big cities of any other country overnight. In Year 2 of the Atomic Age this arms race is already on.

It will not fail for lack of raw materials; every country has lean ores worth working for bombs.

THE CHEAPEST DEATH

Cost need not deter, for the atomic bomb is by far the cheapest method of destruction ever devised. General H. H. Arnold estimates that atomic bombs can be manufactured *and delivered* for less than $500,000 per square mile of destruction.

Don't be misled by the two billion dollars America spent on a project that dropped only two bombs on the enemy. New plants can be built at a fraction of wartime cost, and the investment spread over thousands of bombs, not just two.

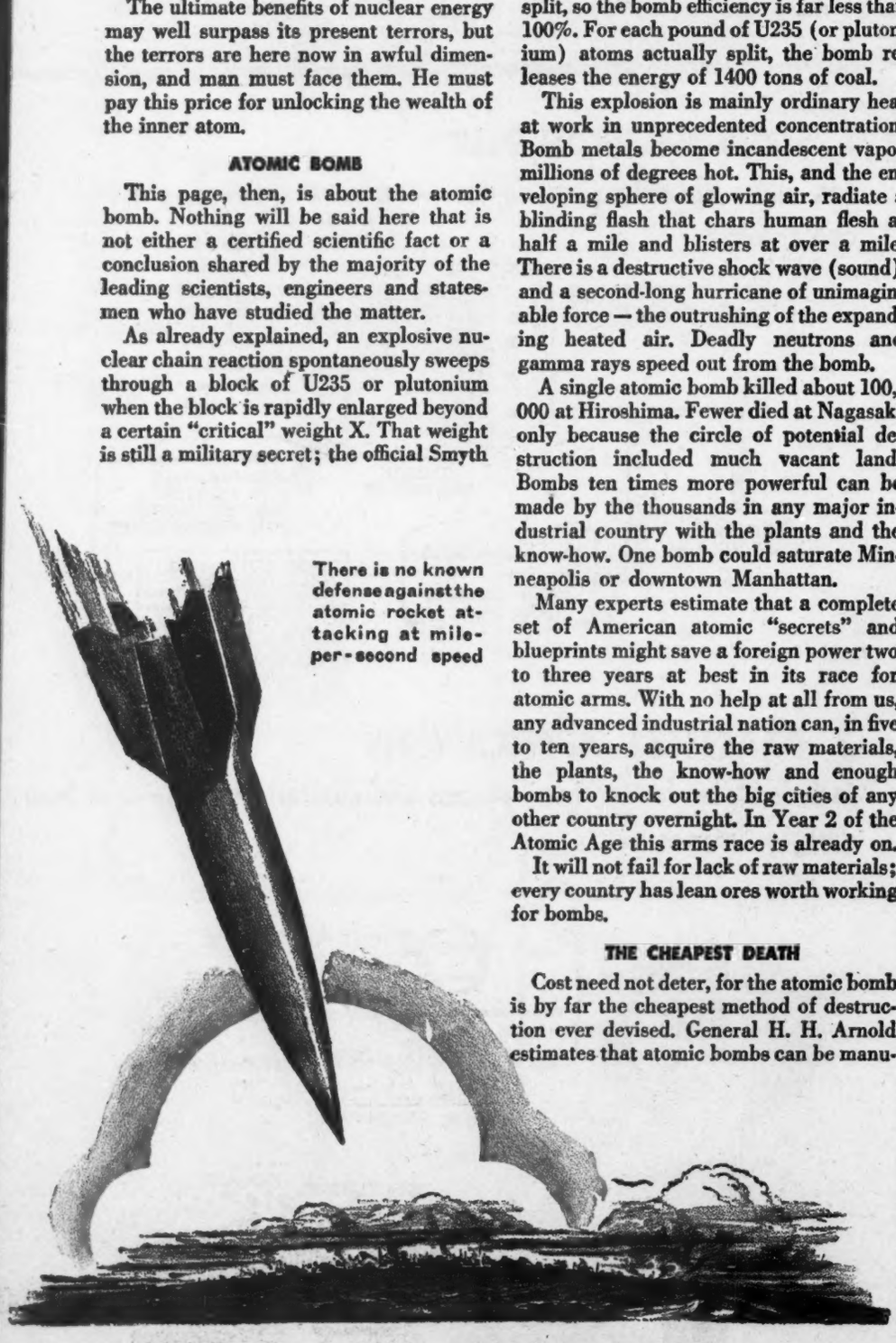
NO DEFENSE

So the bombs can be made in ample quantity and paid for, but can they be delivered? The answer is: "Yes; by the time the bombs are ready they can be delivered anywhere and overnight." If the defenses of the target country are weak, piloted planes can get through in ample number. Ten percent would be enough.

For more effective delivery radio-steered pilotless planes and rockets can carry the atom bombs faster than sound. Such weapons will be almost untouchable by either antiaircraft artillery or manflown fighters.

Greatest threat of all will be the transoceanic rockets. The German V-2 rocket, which never once was stopped by Britain's defenders, points one way. It needs only transatlantic range (with atomic propulsion) and an atomic bomb in the nose. Forty-six feet long, loaded with 7500 lb of alcohol fuel and 11,000 lb of liquid oxygen, the V-2 of World War II rose 60 miles in the air and arced 200 miles in five minutes to deposit one ton of TNT in London.

Seeing so many strange things come to pass, the man in the street cannot distinguish between possible miracles and the impossible variety. From the very start of the Atomic Age he has been hoping for a "ray" that will explode the atom bomb far off. Competent scientists and engineers say that cannot be.



There is no known defense against the atomic rocket attacking at mile-per-second speed

The only way to bring down a 3500-mile-per-hour rocket at a safe distance is to chase it with your own 4000-mph rocket. You can't win at this game often enough to establish ironclad protection.

The only specific defense against the atomic rocket known in Year 2 of the Atomic Age is to disperse all cities and put key industries underground. This would be very costly in time, money and national morale.

MORE AND BETTER BOMBS?

Some will ask whether the U.S., as the most powerful industrial nation, could not build more and better bombs and carriers than any other nation. Probably yes, but there is still no real security. If the "weak" opponent has enough atomic weapons to destroy us once, what advantage is there in being able to destroy him twice?

Shooting first could protect us now, but not after the world is atomically armed. If we were to destroy the enemy's cities, we would probably miss his well-concealed and protected bomb magazines and rocket launchers. A few minutes later he could return the atomic fire. In brutal simplicity, that is the picture of future atomic war. Everybody loses.

At this point one grasps at another straw: "If everybody is to lose who would be so foolish as to start an atomic war? And didn't the Germans refrain from using gas for a similar reason?" Possibly yes. It *may* work that way. But in a world atomically armed to the teeth some nervous finger *may* pull the fatal trigger.

ONLY ONE WAY OUT

Throughout history each new offensive weapon has called out its appropriate defense. But now the offense leaps centuries ahead in a single bound and the defense lies almost helpless everywhere, unless some technical protection, unknown as Year 2 begins, can be devised.

The situation is extremely dangerous. There is no clear way out except through some sort of international action first to stop the atomic arms race and, before it is too late, to hobble war itself.

Can it be done? Perhaps not, but there is no alternative except atomic chaos.

...so he faces the Atomic Dilemma...

THE NUMBERED statements that follow in somewhat logical pattern are too fateful to be accepted on anybody's say-so. Every reader should test them in the light of his own information and understanding.

The points below sum up the conclusions of the previous article — and these in turn reflect a great mass of thought and discussion among leading scientists, engineers and statesmen close to the problem. To an amazing degree they concur on both facts and conclusions. For authoritative statements of their line of thought, in detail not possible here, the reader should see the recent book, *One World or None.*

THE DILEMMA

Nations must either face the probability of an atomic World War III, which would surely be the most deadly in history . . .

***Or*, the experts propose, yield both atomic weapons and war potential to international authority backed by superior force.**

What the Experts Say

1. In five to ten years any major industrial nation can make enough atom bombs to destroy all the major cities of any other country overnight.

2. This assumes no "secret" information or other help from us.

3. The necessary uranium ores will be at hand.

4. The cost will not be too high.

5. The bombs produced can then be carried thousands of miles by bombers, or by atomically powered guided missiles moving faster than sound.

6. There will probably be no effective military defense against such weapons.

7. Dispersing cities, and putting key industries deep underground, will give some protection if accomplished in time, but at incredible cost in money and human discomfort.

8. In a world atomically armed, nations can probably protect their bomb stocks and rocket launchers from enemy assault.

9. If so, nation A can destroy the cities of any other nation B, after which B's rockets will destroy the cities of A. Shooting first will not win an atomic war.

10. This knowledge may not restrain the trigger finger of a suspicious power.

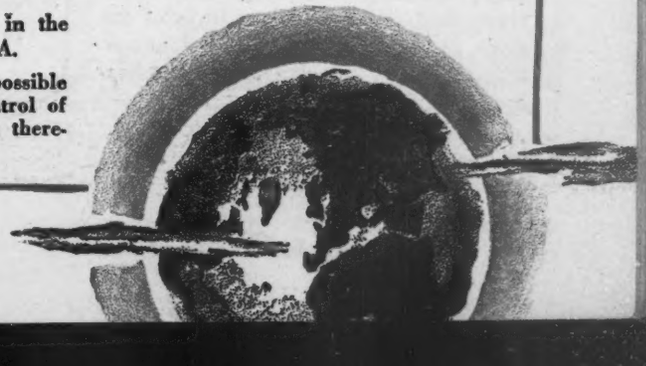
11. Having more and better atomic weapons than the other fellow won't help much if he has enough to destroy us. No use to kill a man twice or rebomb urban ruins.

12. Every nation is vulnerable in the Atomic Age, including the U. S. A.

13. National security will be impossible without (first) international control of atomic arms and (not too long thereafter) international control of all war potential, both backed by superior physical power.

14. If action to this end is long delayed, it may become impossible to halt the atomic arms race already started.

15. At best, the necessary degree of international control, with some real delegation of national sovereignty, will be a revolution in human affairs. It may prove to be humanly unobtainable at this time. If so, men and women everywhere must face the probability of an atomic third world war—by far the most destructive in all history.



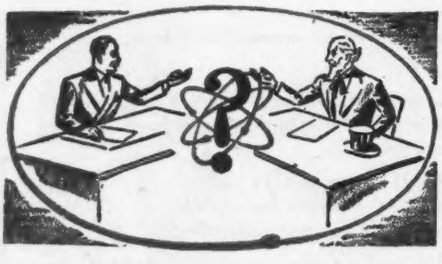
In this atomic age no nation can be safe through its own unaided might

..and the Great Debate unfolds

ATOM YEAR 1 has probably been marked by more debate on a single subject than any other twelve months in the world's history. Social, economic and political as well as purely technical issues have been pressing for realistic solution. Let us look at these issues and see where we stand:

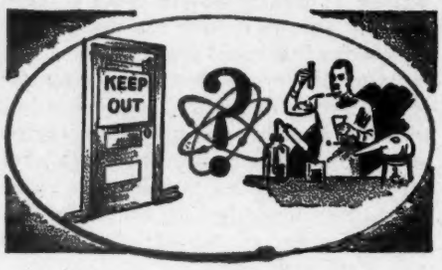
CIVILIAN VS. MILITARY

Because the atomic bomb is the world's greatest weapon, the armed forces would like to control it. But because atomic energy can also be used for peaceful, beneficial purposes, civilian control seems equally essential. These conflicting viewpoints had their strong proponents before the Congress which finally reached a fairly satisfactory compromise in the Atomic Energy Bill of 1946, setting up a competent civil board with which the armed forces will have continuing liaison. As we go to press, just before Year 2 of the Atomic Age begins, this bill has passed the Senate, but there is still a question how rapidly it will be enacted into law.



PRIVATE VS. PUBLIC

Atomic energy is "too big" and "too hot" to be handled privately. It must be nationalized and internationalized. The questions are *how* and *to what extent.* Fortunately, as the "boxes" on these pages show, there are means that may attain reasonable safety against misuse of the atom, and still do so without public control of many "non-dangerous" applications.



SECRECY VS. FREE SCIENCE

Throughout the first year of the Atomic Age hot debate has raged around "keeping the secret of the bomb." To prevent potential enemies from making atom bombs some have urged a complete blackout of all phases of atomic energy — even of the scientific fundamentals of nuclear physics. Others have sought immediate and complete disclosure of all bomb "secrets," both scientific and technological. These have held that such information cannot be effectively hidden, that secrecy blocks progress and breeds wars.

A year of debate has brought the great mass of vocal opinion to this middle ground: (1) Ease restrictions on the exchange of basic physical knowledge. (2) Release for industry's benefit many of the devices and methods developed for the bomb project. (3) Hold tight to specialized information on atomic bombs and bomb-material production until international safeguards are fully operative.

DOMESTIC CONTROL AS PLANNED IN THE ATOMIC ENERGY BILL OF 1946

McMahon Committee Bill contains the following provisions.

Policy. Declares it the policy of the U. S. to develop and utilize atomic energy to improve the public welfare, increase living standards, strengthen competitive enterprise and promote world peace.

Organization. Establishes the Atomic Energy Commission (AEC) of five administrators to direct four divisions on research, production, engineering, and military applications—to work in liaison with three committees from (1) the armed forces, (2) outstanding civilians, and (3) joint Congressional representatives.

Production. AEC to own and operate (under management contracts with industry if deemed desirable) all facilities for the production of fissionable materials, such products to be distributed with their radioactive byproducts under license for private industrial and medical research.

Military Application. AEC to engage in development work and produce atomic bombs as directed by the President, to be delivered only on his order to the Armed Forces.

Industrial Utilization. Permits AEC to conduct research, design and manufacture equipment for atomic-energy utilization, license its use, produce and sell power obtained as a byproduct in the production of fissionable materials. Directs AEC to give widest safe scope to private initiative.

Control of Information. AEC to enforce a ban on the dissemination of restricted data that might be used to injure the U. S. or secure advantage to a foreign nation, yet to provide leeway for ultimately relaxing restrictions as future conditions warrant.

Patents and Inventions. No private patents permitted for production of fissionable materials or their utilization for military weapons, but AEC will justly compensate for such inventions, when made by private citizens. Patents for non-military applications may be purchased or condemned by the AEC only when public interest is affected.

Appropriations. "Such sums as may be necessary and appropriate to carry out the purposes and provisions of the act" *plus* unexpended funds of the Manhattan Engineer District.

while Time runs out

NATIONAL VS. INTERNATIONAL

Born of nationalism, the Atomic Age began when three nations discovered a weapon that today gives them the greatest military power on earth. The prime question is: Shall the atom remain the servant of its conqueror, nationalism?

During Year 1 of the Atomic Age the Truman-Atlee-King declaration, the masterly report of the State Department's atomic consultants, and the U.S. representative on the United Nations Atomic Energy Commission, have all called for international control of atomic energy. Year 2 will start with no such control. This failure to decide and act is in part a natural result of the extreme difficulty of the problem and the obvious dangers of unwise decisions. Nations everywhere face a triple dilemma in this Atomic Year 2: the dangers of nationalism, the dangers of internationalism, the supreme danger of not being able to make any decision in time to meet the atomic bomb threat.

INTERNATIONAL CONTROL AS PROPOSED BY THE U.S. TO U.N. ATOMIC COMMISSION

Baruch statement follows constructive path laid out by Atomic Consultants in "Acheson-Lilienthal Report."

The Plan. The U. S. has proposed that all nations band together to outlaw the use of atomic energy for war and to promote and harness its development for the benefit of mankind. To this end an International Atomic Development Authority would be set up, and to it the U. S. would turn over, at various stages of its organization, all atomic bombs, know-how, raw materials, facilities, and stockpiles of fissionable material. Thus IADA eventually would supersede national authorities on some matters and supplement them on others.

Owner and Operator. IADA would take over from national authorities or private ownership full management and control of all atomic energy matters that afford a possible threat to World security. These include:

1. Raw Materials—Supplies of uranium and thorium to be inventoried, controlled, and developed by IADA.
2. Facilities—IADA to control and operate plants producing fissionable materials and to own and control their products.
3. Research—IADA to undertake research and development on all aspects of atomic energy and to possess exclusive right of research on atomic explosives.

Private Initiative. Will have its chance to push forward the use of atomic energy for peacetime (non-dangerous) purposes. With IADA providing raw materials and carrying out necessary inspection, national and private enterprise may operate "safe" power piles, and produce and use radioactive isotopes for research, clinical and other applications. Radioactive isotopes produced by IADA also can be distributed for peacetime use.

The Mechanics of Safety. No plan is a certain guarantee against future atomic war. This plan should, however, prevent surprise attack with atomic weapons; for IADA is to buttress positive ownership or management controls with wide powers of inspection. Obviously, successful inspection rests on complete freedom of access or egress in any area.

Sanctions. At the heart of the plan lies the problem of penalty for violation — a matter for profound statecraft. To the U. S., one aspect of sanctions appears crystal clear: Here is an area where the veto right now held by the five great Powers must be redefined if it is not to be incompatible with the meaning and purpose of the proposed control.

Leading industrial nations can produce atomic bombs in five years, competent scientists announced after Hiroshima. Already one year of the precious five has been consumed in debate without international action. Soon it may be too late to check the growing momentum of the atomic arms race.

TIMETABLE—ATOM YEAR 1

1. July 16, 1945. World's first atomic bomb detonated in New Mexico.
2. July 26, 1945. President Truman and Prime Minister Churchill issue Potsdam ultimatum threatening Japan's destruction if she continues.
3. August 6, 1945. Atomic bomb dropped on Hiroshima.
4. August 9, 1945. Atomic bomb hits Nagasaki.
5. August 11, 1945. Army releases Smyth Report on "Atomic Energy for Military Purposes."
6. August 14, 1945. Japan accepts terms of Potsdam declaration.
7. November 15, 1945. Truman-Atlee-King issue declaration of intention and procedures looking toward international control of atomic energy by United Nations.
8. March 28, 1946. State Department issues Acheson-Lilienthal Report on the "International Control of Atomic Energy."
9. April 12, 1946. Manhattan Engineer District announces program for experimental development of atomic power.
10. June 1, 1946. "Atomic Energy Bill of 1946" passes Senate unanimously, is referred to House of Representatives.
11. June 14, 1946. First meeting of United Nations Atomic Energy Commission (Bernard Baruch as American member). Manhattan District announces availability of radioactive isotopes for research use.
12. July 1946. Joint Army-Navy tests of atomic bombs at Bikini.

..but if Man Masters Atom..

IF MUTUAL DESTRUCTION by the atomic bomb can be avoided, the first century of the atomic age will bring immense advances in scientific knowledge, health and living standards. Already many prospective benefits can be outlined, but those we can neither foresee nor suspect may be even more important.

This prediction is grounded in scientific experience; the most fundamental discoveries have always been the most fruitful. The study of molecules gave us chemistry. Faraday's experiments with electricity and magnetism are the foundation stones of the great electrical industry. Can one expect any less from an understanding of the heart of every atom?

BENEFITS

Atom-splitting benefits clearly visible today fall mainly in three classes: (1) heat and power applications of the uranium piles; (2) general industrial applications of equipment and methods originally developed for the bomb project; (3) chemical, biological and medical uses of the "tagged atoms" (radioactive isotopes) now abundantly available from pile operation.

It is now evident that the energy yield of the U235 in an atomic pile can be multiplied many times by returning to (or leaving in) the pile the plutonium and possibly the U233 produced respectively from the U238 and the thorium in the pile. This is an indirect way to "burn" inexpensive U238 and thorium, and thus greatly extend the supply and reduce the cost of atomic fuels.

POWER APPLICATIONS

Although present piles run at low temperatures, it is certain that temperatures high enough for the efficient operation of steam and gas turbines will be attained. Already an experimental atomic power plant has been ordered. Atomic power for certain remote installations (say, for heating Arctic airports) may not be far off.

In five or ten years uranium piles will be driving a few experimental ships and submarines. In 20 or 30 years uranium may begin to compete widely with coal as a fuel for suitably situated large central heating and power plants. The 50-ton minimum weight of shielding rules out nuclear power for automobiles and small piloted planes.

SPECIAL USES

Some day ultra-high temperatures from splitting atoms will be used for special industrial operations on metals and other materials. Even the dread atomic bomb might easily serve peaceful ends — blasting lakes in deserts, changing the course of rivers, leveling mountains.

INDUSTRIAL BYPRODUCTS

The special industrial equipment and methods developed for the bomb project will find hundreds of important uses — mostly for purposes unrelated to atomic energy. These developments include pumps with neither seals nor leaks, leak detectors of amazing sensitivity, ultratight welding, a portable mass spectograph for quick and automatic gas analysis, new ways of handling corrosive and poisonous materials, new diffusion barriers for the separation of gases and of petroleum products.

TAGGED ATOMS

Yet more important than any of these, in the long run, will be the hundreds of radioactive isotopes now available as by-products of pile operation. Chemically indistinguishable from the ordinary forms of the elements, these isotopes serve as tagged atoms or "spies" if mixed with common stable atoms of the same species. They "fly with the flock," and can later be identified as surely as banded birds. With these amazing tools of research, the course of any element or compound may be traced through the bodies of men, animals and plants. Similarly, tagged atoms may be used in studying the course of many kinds of industrial and chemical operations.

BIOLOGY AND MEDICINE

A suspected hyperthyroid condition can be diagnosed by feeding the patient a minute measured amount of radioactive iodine. The click of a "Geiger" counter placed on the patient's neck will tell (1) what percentage of the swallowed iodine concentrates in the thyroid cells and (2) how rapidly that concentration is accomplished — giving a definite indication of the state of the gland.

In similar fashion the radioactive isotopes of hydrogen, oxygen and carbon will trace out the intricate transformations of carbohydrates and proteins in the human body. Radioactive phosphorus will explore the bones. Radioactive iron will show how and where blood cells are formed. Radioactive sodium will time the circulation of blood.

USES IN INDUSTRY

In chemistry the radioactive isotopes will speed the understanding of metallurgical and organic reactions. In industry they will measure flow, detect leaks, and do other useful work.

Meanwhile the uranium piles will be manufacturing certain radioactive isotopes that can serve as cheap but effective substitutes for high-cost medical radium.

KNOWLEDGE COMES FIRST

It is already clear that the chief benefits of atom splitting will come first as new scientific knowledge rather than as new engines and gadgets. But in the long run man's new understanding of the inner atom will enrich the whole range of human activity. This has always been the case with less fundamental discoveries in science. It can hardly be less with this most fundamental discovery.

ATOM SPLITTING WILL SERVE MAN IN:

Defects of Price Control

Much of the anxiety about food price increases when OPA died was groundless. To judge by some of the outbursts, the prices of all things had been expected to go to extravagant heights.

Calm reflection will reveal that black market prices were the very tops that could be attained. With controls removed it was not likely that prices would go still higher. If prices higher than recent black market quotations could have been possible, would it not be probable that the adroit and none too scrupulous black marketeers would have been getting them? Black markets in food are free markets, where supply and demand have free play within their limited scope. This is not, however, to condone exorbitant food prices. Yet high prices are possible only where buyers pay them.

Price control under OPA and OES was an effort to hold prices on a horizontal line, but it was no more of a reality than prohibition under the 18th Amendment and the Volstead Act. Even a so-called Bone Dry state law, such as existed in Indiana in the Twenties, did not prevent the thirsty from procuring alcoholic beverages. Price control, like prohibition, has not been a reality.

Americans Dislike Restraints

The reason for failure of price control is not hard to find. It is a fundamental fact that for three centuries America has been the gathering place for huge numbers of the dissatisfied and discontented people of the white race. This is one of the basic causes of the "American Way." Without dissatisfaction with well nigh everything, our economy would be puny. Industrial progress and change would be as slow as in most of the nations from whence our forebears came.

But this same dissatisfaction makes it difficult, indeed, to impose restraints and regulations, especially those restraints where no moral issue exists. It earns for us a reputation of lacking discipline, sense of duty—even respect for law. Visitors come to America to discover what makes it possible for us to have motor cars enough for every one to ride at once, or to find out why we have more telephones than all the rest of the world. They never seem to learn that our dissatisfaction with things as they are, plus our natural resources, make it possible.

Chester Bowles as head of OPA, and later of OES, tried valiantly to do an impossible job. He failed, however, to recognize the weight of the total dissatisfaction that characterizes his fellow man, especially in peace time. President Truman's giving way on the 18½ cent wage increases in basic industries made Bowles' job doubly impossible.

NEVERTHELESS, an equally important source of Mr. Bowles' troubles was his oft repeated belief that increased sales would make it possible to pay higher wages without increasing selling prices. Reasoning from his experience as advertising counsel for a few concerns, he generalized that all concerns in all industries could do likewise.

Common sense will tell us otherwise. It cannot be done by everybody even though it has been done by the fortunate few. Consider the experience of an executive in the radio receiver industry who was the first in that field to use the Free Deal. After he had retired, I asked him if he considered Free Deals to be sound business.

"They are sound as long as you are the only one who uses them. But as soon as anyone else in your line uses Free Deals they are not sound for either party."

In my opinion Mr. Bowles has never attained the foregoing perspective.

PRICE controls for food are politically desirable, but where the food is a perishable they are futile. Perishables such as fruit, vegetables, meat, eggs, fish, butter, milk, or cream are commodities of rapidly diminishing values. Unless marketed promptly they have little appeal to consumers.

The most talked of black market items are two fairly perishable commodities: meat and butter. Neither can be economically stored for very long periods. As soon as they were released from price control violent price changes occurred, but the supply has commenced to increase. And, in no case that I have been able to discover has the free price gone as high as the previous black market price.

While the President has reluctantly approved the new price control law, there is much doubt that it will control inflation or induce production. Even the decontrol board is a questionable substitute for supply and demand.

As one famous economist once put it, "The best remedy for high prices is high prices." I do not, however, advocate runaway prices, but legislation is no substitute for self restraint of all people.

H. V. Burton EDITOR

The Talk of the Industry

• VIRGIL O. WODICKA of Ralston Purina Company reminds us of a boner in April in which we referred to lemurs instead of lemmings.

Virgil: You are supposed to be a food technologist, not a naturalist.

• DUTCH DIEHL, of Refrigeration Research Foundation, is of the opinion that a decoration is in order for the fellow who wants "to wipe out that foul paste known as cream sauce from our national menu."

Dutch: Have you never eaten Eggs au Gratin a la Mornay?

• HOW the larger meat packers could maintain their earnings was the basis of many a financial commentator's remarks during the June livestock shortage. Some of them opined that side lines and byproducts were the answer. Wall Streeters seldom lack an explanation.

• THE best laugh of the month came when an investigator from the Treasury Department called at the offices of Food Industries endeavoring to trace the disposal of two pounds of margarine purchased six years ago (so he claimed) from a Wisconsin firm by our late associate editor, G. L. Montgomery, who died in 1944. The point made by the investigator was that if Monty had sold it, as an unlicensed dealer, he would be liable to pay Uncle Sam about $500.

• FAO HAS proposed an international research and information service, which would survey the world's food resources continually and report quarterly to members of the United Nations. If the reporting is comprehensive and accurate, this will be one of the most useful services that could be set up. But without Russia's cooperation the reports will have very limited value.

• A NEWS ITEM from Brazil two days after OPA's death reported a near panic in coffee. Local rumors that lifting of our ceiling prices would soon take all the coffee out of Brazil caused a run on coffee shops in Rio de Janeiro and necessitated calling out police reserves.

Possibly the rumors had to do with the better grades of coffee. A really good cup of coffee is still a rarity in the U.S.A.

• WHEN the wheat restriction orders went into effect, bread suddenly became such desirable property that early morning deliveries to retailers had to be abandoned to avoid pilferage. And, bread went under the counter. Human nature is wonderful.

• THE housing shortage may not be of serious moment to readers of FOOD INDUSTRIES, yet it is interesting to learn some of the reasons for its persistence. One large producer of building materials is running a reconverted plant at only 55 percent capacity because there are not enough houses near the plant for the needed 3,000 additional employees. These could push production to capacity.

Yet, until the veterans are taken care of, the producer of housing materials is not allowed to build any houses for employees to produce more material for veterans' houses.

• RUSSIAN scientists have developed, so they claim, five varieties of perennial wheat from which they can get three crops from a single sowing. Nothing is said about its usefulness in flour milling.

Except for animal feed purposes, the development of such new varieties, without an eye to the principal market for the grain, may easily come a cropper. Just 20 years ago one of our own state agricultural experiment stations brought out some new wheats that were rust resistant and big yielders, without conferring with the millers. When the new varieties started to come on the market in sizeable quantities it was learned for the first time that the berries were so hard and flinty that they could not be used for flour in a blend with the normal wheats. The farmers who produced them were docked heavily thereafter. Much uncomplimentary language ensued.

Hors d'Oeuvres

• *Now we hear of a new chewing gum that will not stick to floors, sidewalks, shoes and presumably chairs. This brings the parking problem right down to the dinner table.*

• Cherimoyas, sapotas, lemon guavas and "tuna" cactus are said to be among the new fruits nearing mass production stages in California. Won't it be wonderful when they start throwing those terms around in Tony's Fruit Shop.

• *The Wine Institute says that scientists forecast an "invisible" sound, far beyond the range of the human ear, which may accelerate the aging of wines. Might work! We know some "visable" sounds that are certainly aging us.*

• Corn crop looks good, in fact, excellent. We can hardly wait to sink into a big golden cob, oozing rich cream cheese or mellow peanut butter.

• *Fluorescent light has been found an effective aid in speeding up beef grading. O. K. with us if the beef grades the same in daylight.*

• In its recipe column, the New York World Telegram says, "Open face pies need a pretty garnish of some kind. This cream cheese decoration tastes as dreary as it looks." Maybe the writer meant "cheery" or maybe a New York restaurant bread spread was still fresh in mind.

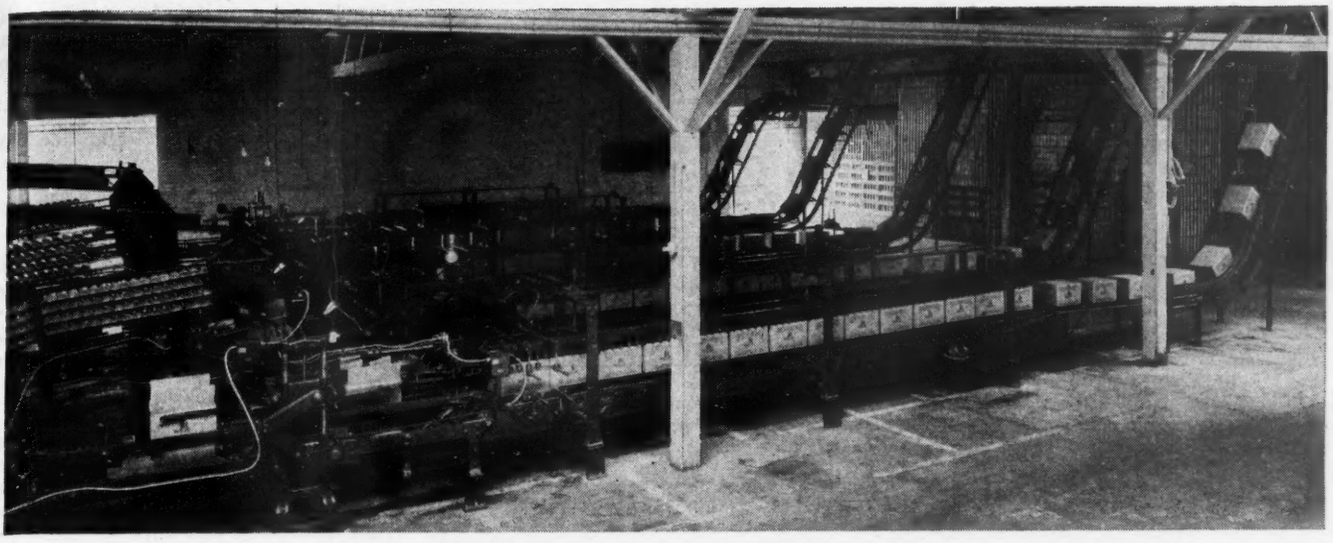
• *Bordens tells us the largest recorded output of milk by one cow is 19,508 qt. in one year. This is, they continue, 53.4 qt. per day, or ten glasses per hour day and night. Something for the insomnia victims to investigate.*

• What happened to the OPA last month was enough to make the black markets turn grey. In fact, some did.

• *A man in West Virginia has an unmolded slice of bread that was sealed in a jar Nov. 3, 1898. Our Midwest editor claims to have seen a fresh slice, July 6, 1946.*

• Chou-Chi Mei-Wei-Fen is the name of a new food flavor accentuator soon to be offered to the nation's restaurants by the International Minerals & Chemical Corp., Chicago. This still leaves pepper a heck of a lot easier to yell for if you're in a hurry.

J.A.J.J.



This is where the continuous-flow conveyor method pays dividends. Cases are being sealed automatically while en route to warehouse.

The Do's and the Don'ts Of Materials Handling

Here are valuable pointers on the laying out of buildings, placing of equipment, handling of stock and arrangement of storage facilities. They will help you to make the most of pallets, trucks, freight elevators and conveyors of all kinds

By JOHN I. THOMPSON, Consulting Engineer, Washington, D. C.

SO many things affect good materials handling and warehousing methods that it is impossible to obtain the best results by merely adding a piece of equipment or some floor space without considering its effect on the plant as a whole. Here are pointers on many of the factors that must be considered.

General

DO make up a scale layout of your plant, using scale templates of stores and equipment as your first step in a study.

DON'T plan your space requirements by guess, by word of mouth or by ear.

A few hours spent moving around cardboard templates of stock, equipment and fixtures will reveal whether or not that "bright idea" of placing a truck dock on the north side is such a bright one after all.

DO make a breakdown of present costs by each physical step, using this to compare with estimates in the proposed plan.

DON'T just compare the present cost with the totaled estimate of a proposed plan.

This is as obvious as comparing, or not comparing, apples and oranges. Frequently, one or two steps will prove much greater earners, or no earners at all, when compared with other steps.

DO obtain all details on what is to be handled and how much. This cannot be too complete and should show all peaks by appropriate time elements. Design for the future, too.

DON'T use overall handling figures or averages from annual records. Congestion from a peak load for one day, which is two or three times the average, may require a week or longer to unsnarl.

DO obtain technical information as to storage requirements, such as temperature and humidity, and let these control your plans.

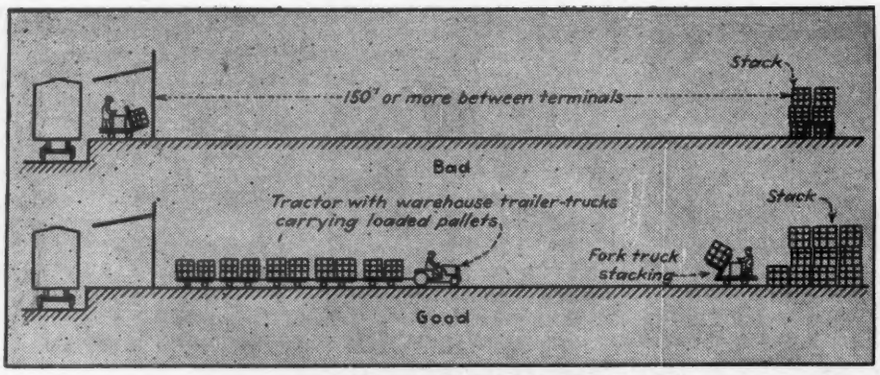
DON'T assume that there is no room for improvement because storage and handling have been satisfactory in the past.

DO set up basic statistics covering sizes, weights, volumes and time in process in your study of each item. Be consistent in the use of these facts.

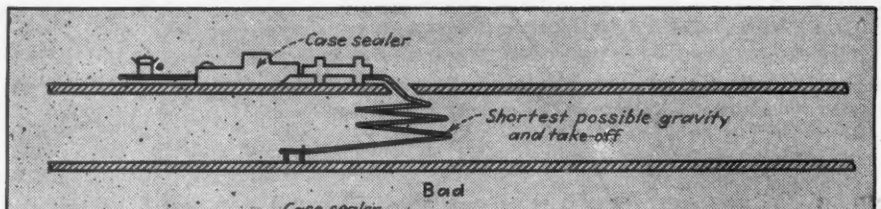
DON'T make a partial study, estimate or, more likely, a guess.

DO work toward, and conclude as early as possible, a basic integrated plan, including flow diagrams, space reservations and flow charts. Keep filling in the charts as your studies and plans progress.

DON'T work out your plans disjointedly and then try to justify these haphazard



On long hauls through the plant or warehouse, cut costs by making your loads as large as possible. This may require the use of a tractor-trailer rather than fork-lift trucks. Fork-lift trucks should be used as lifting machines and not as conveyors.



In laying out your conveyor, make certain you have sufficient space at the take-off end for accumulating loads and for accommodating pallets and fork-lift trucks so as not to keep your personnel waiting while full loads of cases are being assembled.

conclusions in a whole plan, just because you worked upon them. If you follow a generalized scheme in the first place, these pitfalls will be avoided.

DO consider all possible types of handling equipment.

DON'T start with a preconceived notion that the job is to be done by pallets, or in any particular way.

In some instances 100 *percent continuous-flow conveyors may be desirable. In most instances, a compromise, using a combination of trucks, pallets and conveyors will prove best.*

DO study your materials handling problems as a whole. To install the seemingly best system at one operating point may have ill effects at preceding or succeeding ones. Make any one installation fit a general plan.

DON'T isolate a single material handling problem in your study. One problem should not be isolated from another in the same plant nor from production activities. Otherwise, you may make a break in your operations.

The advantages of standardization should be gained where functional efficiency does not suffer. The need to estimate the effect on departments from which and into which material in interdepartment transport moves is as important as intra-department movement. Easy handling and storage by palletization may be gained by a receiving department, but the material must be palletized in the first place. When? How? Where? By whom? At what cost? And, how about empty pallets? And space? These and other questions require satisfactory answers. Similar ones must be asked and answered for any other method of handling proposed.

Unit Load Handling

DO select pallet or truck size by considering: (1) In what lot amounts do items move to the best advantage, (2) size, shape and weight of containers and how containers fit on a given size pallet or truck, (3) allowable aisle space in plant warehouse and (4) size and spacing of columns, as well as area of space, in which the proposed operation will be conducted.

DON'T be mislead by the usually accepted theory that the most economical unit load is the largest possible. Broken lots, partial loads and maneuverability may have an astounding effect on an installation made blindly under this assumption.

DO consider the length of time in stock for each item handled and use bulk storage when the expectancy is more than three months.

DON'T use a pallet for permanently storing material. Pallets are handling aids, and are most economical when used as such.

DO select equipment with adequate capacities.

DON'T determine equipment design for net sizes and capacities.

DO work out elevator usage in multi-story buildings as a part of your handling system where possible. Use gravity accumulation and take-away at elevator entrances, which facilitate handling by elevator attendant.

DON'T try to use elevators for regular transfer or for movement of fork trucks from floor to floor in multi-story buildings. This ties up elevators, fork truck operators and fork trucks. Some other way is indicated.

DO work out a tractor-trailer-train system in conjunction with fork trucks where long hauls are necessary.

DON'T use a fork truck for long hauls. Fork trucks are, essentially, lifting machines.

DO design exits and entrances of adequate size and type for plant and warehouse. Have depth for accumulating loads. Have entrances at car or truck floor grades. Maintain door widths with sufficient clearance for safety and passage.

DON'T operate through exits and entrances that are bottlenecks. They may be too narrow, too shallow or not at car or truck grade. To operate this way invites accidents and also causes delays.

Let your study include speed of movement through the exits and entrances to determine possible conflicts and delays. Determine adequate space to handle a maximum of set-off or set-up for quick receipt or dispatch. Have this space accessible and eliminate tortuous passage from exits and entrances.

Continuous Flow Handling

DO determine adequate accumulation during conveying and on conveyor to take care of all possible fluctuations of feed and discharge.

DON'T just set up to move material from one congested area to another.

DO consider all types of conveyors, such as belt, gravity rollers, driven rollers, slat conveyors, chain or cable conveyors, trolleys, bucket carriers, flight conveyors, screws, draglines, pneumatic conveyors, pumps, hoists, spiral chutes and elevators. Consider combinations, such as a belt to gain elevation, feeding onto gravity rollers for accumulation of stock.

(*Turn to page* 232)

"Shelf" Curing of Cheese— What Are the Facts?

Fifty years ago all Cheddar cheese was cured at high temperatures, with large losses from evaporation, mold and insect infestation. With low-temperature aging, losses are minimized, and a more uniform cheese is produced at a lower cost

By ARTHUR B. EREKSON, Director of Research
Lakeshire-Marty Company, Plymouth, Wis.

A RECENT PRESS release from the Bureau of Dairy Husbandry on cheese curing has caused a flood of questions among cheese makers and assemblers. Why do we hold a good part of our Cheddar cheese in cold storage at 35 deg. F. if it will cure faster and better at 60 deg. F.? Isn't low temperature curing a very uneconomical procedure? Are there any disadvantages to high temperature curing? How much is to be gained in profit in curing at 60 deg. F.? Why haven't we known before of this so-called new method for producing aged Cheddar cheese in three to four months? Does anyone cure cheese at 60 deg. F. today? These are the questions.

Described in 1895

Many of the answers may be found, not in current literature but in the dusty files dating back to 1895, when practically all of the cheese was cured at 60 deg. F. and the recommended aging time was a period of three months. Looking back a few years may help us to look forward with judgment and profit, so let us review a few paragraphs from 50 years ago.

John W. Decker,[1] an instructor in dairying at the University of Wisconsin, in his book on cheese making, in 1895, wrote:

"The curing of cheese is a process of fermentation, whereby the insoluble curd is converted into soluble peptones. Cheese is cured best at a temperature of 60 deg. F., for at this temperature the gasses have a chance to diffuse and pass from the cheese, without injuring its texture, and the fat does not run out.

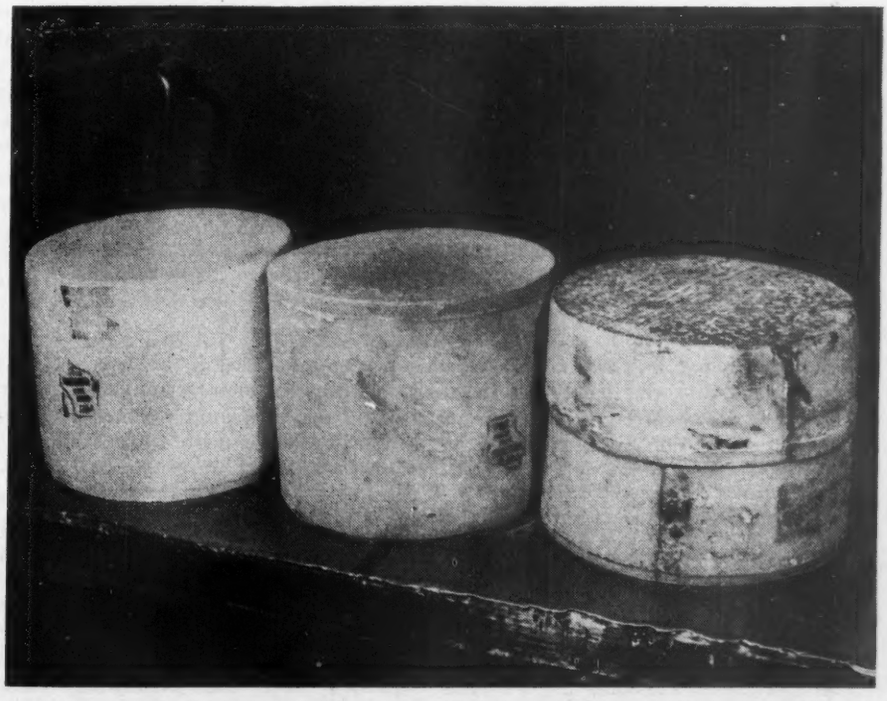
"The curing room must, therefore, be so constructed that the temperature may be kept constant at 60 deg. Cheese also needs plenty of fresh air to make it cure properly and produce a good flavor. If a batch of cheese is divided into two lots and one lot boxed up while the other is placed on shelves, it will be found that the lot in the boxes will cure slower and be inferior in flavor to the lot on the shelves."

Decker goes on with a discussion of the necessity for controlling the moisture or relative humidity in the air in the curing room. He states:

"The air should have as much moisture in it as it will hold without moulding the cheese. Cheese will stand a good deal if the air is kept moving, perhaps as high as 90 percent. If kept between 60 and 70 percent it is very fair, but the instruments show that it often gets down to 20 or 30 percent and the cheese dry out rapidly and crack."

Of course, at that time Cheddar cheese was not paraffined, but there was a practice of greasing, which Decker described as follows:

"As soon as the rind has dried off it should be greased with regular cheese grease. The practice of skimming the whey, after it has fermented and got full of dirt, is nothing less than a dirty trick. Good wholesome grease, prepared for the purpose, can be bought of regular dealers in dairy supplies."



Three lots of cheese that have been aged for nine months. (Left) Held at 34 to 36 deg. F.—in perfect condition. (Center) Cured in dry room at 50 to 60 deg. F.—damaged by cheese mites. (Right) Aged in damp storage at 40 to 50 deg. F.—damaged by mold.

After the trademark is applied the cheese is dipped in hot paraffin. This retards the evaporation of moisture during curing with the result that there is more cheese to sell.

A very short paragraph covers the subject of storing cheese at low temperatures. It reads as follows:

"Cheese in cold storage are very likely to mould, which will work into the cracks, and for this reason buyers do not want cracked cheese. The rinds of high acid cheese, held in cold storage, will also begin to rot in the middle."

Decker's book was revised for the fifth time, in 1909, by Dr. F. W. Woll.[2] He had the results of a series of experiments carried out in the Wisconsin Experiment Station by Babcock, Russel, Hastings and others concerning the ripening of Cheddar cheese, and under the subject, "Curing at Different Temperatures," the following appeared:

"At the Wisconsin Experiment Station a cheese kept at 15 deg. F. for five months was found to have cured perfectly and be of a very fine quality, with the exception that freezing had made the texture crumbly."

The problem of shrinkage had received more attention and information was given on percent of loss (Table I).

The low temperature cheese was better in texture and milder in flavor than the cheese cured at higher temperatures and the low temperatures therefore returned more money, as shown in Table II.

At the end of 20 weeks the cheese cured at 40 deg. F. was worth 22½c more per 100 lb. than that cured at 50 deg. F., and 60c more than that cured at 60 deg. F.

Cold Curing Adopted

By 1909, the practice of assembling cheese in central warehouses for curing had developed to the point of a profitable operation. Decker's book states that central curing rooms at 40 deg. F. were profitable, saving as much as $1.08 per 100 lb. of cheese during a 20-week curing period as compared with curing at 60 deg. F. Cold curing had also spread in practice and under this subject the following paragraph appears:

"During late years the method of cold curing Cheddar cheese has been adopted quite generally by large manufacturers and wholesale dealers. The cheese are kept at the factory for a week or 10 days, and then brought to the cold storage warehouse, where they are paraffined, and kept in cold storage at below 40 deg. F. for two months or more, according to the conditions of the market and the locality where they are to be sold. On account of the improved quality and the minimum losses through shrinkage in the case of cheese thus cured, this method is likely to become of greater importance as our cheese industry is developed and central curing rooms are becoming still more general than they are at the present time."

It is of interest to read the opinion of an English writer, John Prince Sheldon,[3] on the subject of Cheddar cheese curing. In 1912, he wrote:

"The best temperature for the curing of Cheddar cheese is from 60 deg. to 65 deg. F., in which, if well made, they will ripen and be ready for sale in three months or less from the date of making; while in a cold room the same cheeses require twice as much time and a corresponding large amount of storing space will be needed."

To maintain the curing rooms at the above recommended temperature of 60 deg. to 65 deg. F., Sheldon discusses the provision of a heating apparatus and emphasizes the necessity for controlling the temperature.

A few years later, Dora G. Saker[4] wrote in her book, "Practical Dairying," published in London, a paragraph or two on the cold curing of hard-pressed cheese:

"The great advantage of curing in cold storage is a decrease in shrinkage, owing to the smaller loss of moisture. As a consequence, there is more cheese to sell. Cheese kept at 60 deg. F. shrinks about 5 percent. Cheese kept at 50 deg. F. shrinks about 3¼ percent. Cheese kept at 40 deg. F. shrinks less than 1 percent. The cheese produced is creamy, close in texture, and of mild flavor. Cheese kept at 25 to 30 deg. F. requires 18 months to ripen. The great disadvantages of cold curing are the slow returns and the expensive artificial cooling machinery necessary."

Returning to our own publications, we find that in 1913 Henry H. Wing[5] of Cornell University discusses the subject of Cheddar cheese curing in his book, "Milk and Its Products," as follows:

"The green cheese, when taken from the press, is exposed to a temperature of about 70 deg. F. in a pure atmosphere, undergoes a series of fermentations, which result in breaking down or rendering soluble the casein and in the development of the characteristic flavors peculiar to good cheese. The quality of the cheese is best when the ripening process goes on gradually and continually. The higher the temperature, the faster the ripening will go on, an extreme temperature of 65 or 70 deg. F. giving the best results. At the end of from four to six weeks the casein will be so broken down that the cheese is fairly digestible

TABLE I—Percent of Loss in 20 Weeks*

	40 deg. F.	50 deg. F.	60 deg. F.
70 lb.	2.5	2.4	4.2
45 lb.	2.7	3.7	5.1
35 lb.	3.9	5.9	8.5
12½ lb.	4.6	8.1	12.0

TABLE II—Shrinkage in 20 Weeks*

Temperature (deg. F.)	Shrinkage (%)	Score of cheeses	Value 100 lb. at 10c per lb.
40	3.8	95.7	9.62
50	4.8	94.2	9.52
60	7.8	91.7	9.22

*L. L. Van Slyke, G. A. Smith and E. B. Hart, "Experiments in Curing Cheese at Different Temperatures," New York State Agricultural Experiment Station, Bulletin No. 234, 1903.

and fit for consumption, though if kept longer under good conditions the cheese will improve for three to four months, and then if kept moderately cool and in not too moist nor too dry an atmosphere, it may be kept one or two years.

"If the cheese is well made, if the whey has been thoroughly separated in the process of making and if the milk was sound and free from taints, the ripening process will go on regularly even at low temperatures, though the time required is much longer. The resulting cheese will be of the best possible flavor and texture. The practice is now quite general to remove the cheese at the age of seven to ten days at once to cold storage (30 to 35 deg. F.) and to leave them there for several months till fully ripe. This practice is particularly common with cheese intended for winter or export trade."

High Flavor Demanded

We can see from these references that cold curing of Cheddar cheese had become a well-established practice by 1913, based upon a sound economic foundation. It had been quite thoroughly proven that the shrinkage losses were so greatly reduced and the quality of the cheese so improved that high temperature curing was almost completely eliminated. There still persisted, however, a demand for high-flavored cheese of the type obtained by no other means than curing at high temperatures. There was, therefore, a real attempt to offset shrinkage losses by careful control of the humidity in the curing room, and to eliminate losses from defective quality by the careful selection of the cheese to be used for curing at the higher temperatures. As a result of some of this work we find two patents which were issued, one to Edward William Coon,[6] of Philadelphia, in 1926, and one to Henry L. H. Waters,[7] of Montreal, Canada, in 1933, covering procedures of this type. The discussion taken from Coon's patent is of some interest:

"The prime object of this invention is to provide a process for the ripening of cheese through the agency of humidified air at certain temperatures supplied to the cheese ripening chamber, the humidified air having a temperature range and a moisture percentage determined by years of experiment by the petitioner.

"As paraffined cheeses are practically hermetically sealed, they do not ripen as rapidly as if they had not been paraffined. Fermentation requires air for rapid reproduction of the bacteria causing the same. The evaporation of the moisture contained in the cheese should be held to the minimum. If cheese is carried in saturated air, rind rot will ensue."

Two claims are included in Coon's patent, which reads as follows: "What I claim is:

"1. A process for ripening cheese, consisting of supplying, through suitable means, humidified air to a room or chamber set aside for the purpose, the humidified air to have a range of temperature from 45 to 75 deg. F., and a moisture percentage of from 65 to 95 percent.

"2. A process for ripening cheese having an original moisture percentage of 36 to 40 percent and subjecting it to a temperature of 55 to 70 deg. F., in combination with a humidity percentage of from 75 to 90 percent."

Coon developed his process of curing so that "Coon Cheese" became a popular item, and it was well known to the trade by 1935. It should be noted that he cured the unparaffined cheese at a relatively high temperature and humidity and did not attempt to prevent mold growth. In fact, cheese cured by his method developed a thick covering of mold over the entire surface. At the end of the curing period, which was approximately three months, the cheese was paraffined and the mold gave the appearance of a black wax dip. Those who tried to imitate Coon Cheese often dipped cooler-held cheese in black or brown wax to get recognition for their product.

Cheese that is to be cured at 60 deg. F. should be carefully selected for quality. To obtain the best flavor possible the cheese should be made from unpasteurized milk.

Coon really had not contributed much to the knowledge of cheese curing, but he must be given credit for having recognized and supplied a consumer demand, left unsatisfied when the cold storage curing of cheese changed the flavor of much of the cheese supply available.

Waters' Patent

The discussion in Waters' patent recognizes several factors to be controlled in the high temperature curing of cheese. He states that it is necessary to have a definite relationship between the original moisture content of the cheese and the temperature and humidity of the atmosphere in which the cheese is cured by properly coordinating these. He says that it is possible to substantially decrease the length of time required to complete the curing process and also to enhance the quality and flavor of the cured product. In addition, he recognizes the necessity for controlling insect infestation at higher temperatures and describes treating the rind with a saturated solution of disodium phosphate to accomplish this. His discussion covers several important points in the curing of cheese and merits reading:

"This invention is concerned with the ripening or curing of cheese and the object is to provide a method whereby thoroughly ripened products of the finest quality are obtained in a relatively short length of time under conditions such that shrinkage or loss of weight is reduced to a minimum. . . . In current practice, it is not considered feasible to carry cheese in an atmosphere having a humidity content exceeding 95 percent. This is due to the development of moulds and rind rot and to the excessive growth of cheese 'mites' or 'skippers.' After a long period of experiment, I have discovered that this difficulty may be overcome and that certain advantages characteristic of curing cheese in an atmosphere having a moisture content exceeding 95 percent may be obtained by turning the cheese at regular periods during

(*Turn to page* 210)

Are Food Identity Standards Assets or Liabilities?

Restrictive standards may require federal sanction of new or changed products. Pure food items on the market for years may become illegal. Will standards of identity reduce competition and discourage research?

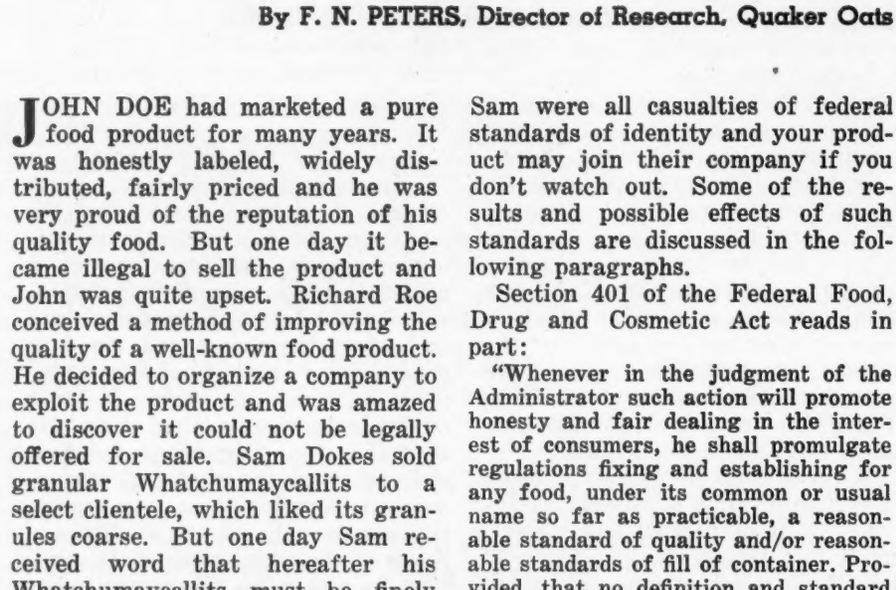
By F. N. PETERS, Director of Research, Quaker Oats Co., Chicago, Ill.

JOHN DOE had marketed a pure food product for many years. It was honestly labeled, widely distributed, fairly priced and he was very proud of the reputation of his quality food. But one day it became illegal to sell the product and John was quite upset. Richard Roe conceived a method of improving the quality of a well-known food product. He decided to organize a company to exploit the product and was amazed to discover it could not be legally offered for sale. Sam Dokes sold granular Whatchumaycallits to a select clientele, which liked its granules coarse. But one day Sam received word that hereafter his Whatchumaycallits must be finely ground. It did him no good to protest that his customers wanted the coarse product. Someone in Washington had decided that Whatchumaycallits must not be coarse.

The products of John, Richard and Sam were all casualties of federal standards of identity and your product may join their company if you don't watch out. Some of the results and possible effects of such standards are discussed in the following paragraphs.

Section 401 of the Federal Food, Drug and Cosmetic Act reads in part:

"Whenever in the judgment of the Administrator such action will promote honesty and fair dealing in the interest of consumers, he shall promulgate regulations fixing and establishing for any food, under its common or usual name so far as practicable, a reasonable standard of quality and/or reasonable standards of fill of container. Provided, that no definition and standard of identity and no standard of quality shall be established for fresh or dried fruits, fresh or dried vegetables, or butter, except that definitions and standards of identity may be established for avocadoes, cantaloupes, citrus fruits and melons."



Witnesses are gathered and await opening of a food standards hearing in Washington.

Standards promulgated under this law have prevented a manufacturer from continuing the sale of a perfectly good food, honestly labeled, and long accepted by the public. Standards have prevented a manufacturer from improving a product because such improvement had not been provided for in the standards of identity prescribed for the food in question. Normal methods of manufacture can be prohibited, the addition of unusual ingredients may be required, the addition of usual components can be prohibited, and both maximum and minimum amounts of all added ingredients may be specified. If the product is granular, the administrator may specify the percentage of product passing through or remaining upon a sieve of specified mesh. Once such standards have been set, no change may be made, regardless of how beneficial it might be to the public, until such change has been considered at a public hearing and the administrator has amended the original standards.

No such standards may be promulgated unless "in the judgment of the administrator such action will promote honesty and fair dealing in the interest of consumers," but just what promotes honesty and fair dealing is left solely to the judgment of the administrator. Fortunately, the administration of this act is in the hands of Food and Drug officials, who have a commendable record for fair and impartial enforcement of the laws entrusted to them. But this does not prevent one from examining the implications to the food industry of such vested power.

Progress of Standardization

Thus far, standards of identity have been adopted for many foods, including white, whole wheat, Durum.

cracked wheat, crushed wheat, self-rising, phosphated and bromated flours and enriched flours of the same grades; plain and enriched farina, semolina, light cream, whipping cream, heavy cream, evaporated milk, concentrated milk, sweetened condensed milk, dried skim milk, Cheddar, washed curd, Colby and several other types of cheeses. In addition, definitions and standards of identity and fill of container have been set for a number of canned fruits such as peaches, apricots, pears and cherries. Fruit preserves, jellies, fruit butters, shell fish, oleomargarine, canned peas and many other canned vegetables have been made subject to similar standards. Since all of this has been done within about five years it is natural to ask whether in another five years, many more goods may be similarly defined and standardized. The trend seems to be in that direction and therefore the food manufacturer who may not yet be affected by such standards should ask himself what may happen to his business if standards are promulgated for his products.

It may be that the first intimation a manufacturer has that his product may be made subject to standards is notice in the *Federal Register* that a public hearing will be held on such and such date to consider establishing standards on this or that food. The large manufacturers have learned to watch the *Federal Register* but the small producers may never know of the hearing until it has passed. A perfectly legitimate product may be ruled out of the market for no other reason than that an administrator decided products of that kind should be eliminated. This statement will be labeled unfair by those devoted to the principle of complete regimentation and regulation of business but judge for yourself whether it is unfair after reading the following paragraphs.

Case of Enriched Farina

A famous case on this point involved farina. For many years prior to the passage of the present Food, Drug and Cosmetic Act, a certain manufacturer had been marketing a product called "Farina - Enriched with vitamin D." The product had national distribution and parenthetically was probably the first food product to use the term "Enriched" in connection with the addition of a vitamin supplement. The product was honestly labeled, contained no deleterious substances and was admittedly superior nutritionally to plain farina. A public hearing was held to consider establishment of standards for flour and enriched flour and farina. Much testimony was taken but little of it was directed to farina. Eventually, however, the administrator promulgated a standard of identity for farina that permitted only pure farina to be sold under that name and a further standard of identity for Enriched Farina, which required such a product to be fortified with thiamine, riboflavin, niacin, and iron with the optional addition of calcium and vitamin D. The manufacturer who had been making farina enriched with vitamin D was now prohibited from selling this product because by definition it was neither farina nor enriched farina.

In the witness chair at one of the sessions.

The manufacturer filed a petition for a judicial review of this order in the Circuit Court of Appeals. It was admitted by the government that the farina containing only vitamin D was truthfully labeled, that it was nutritious and that there was nothing intrinsically wrong with it. The government contended that the administrator had the right to define in detail what a product sold under a specific name should or should not contain. He had the right, said the government, to require additions or deletions of ingredients, even though wholesome and beneficial "if in his judgment honest and fair dealing in the interest of the consumer" were promoted thereby. The Circuit Court of Appeals upheld the manufacturer and the case was carried to the Supreme Court which reversed the lower court's opinion. The Circuit Court had said "—— the regulations do not promote honesty and fair dealing in their (consumers') behalf." The Supreme Court said the standards promulgated "are adapted" to the promotion of honesty and fair dealing. In view of this decision it is generally agreed that if the administrator promulgates a standard of identity it is virtually useless to attempt to have such a decision set aside by court order.

Proposed Standards for Bread

Therefore, it behooves every manufacturer faced with the possible application of standards for his products to see that his position is thoroughly presented at any public hearing that may be called. An example in point is the proposed standards of identity for bread, which incidentally have never been made final. Under these there is no provision for such well established and old time products as "soya bread," "oatmeal bread" and similar items. It is indeed difficult for many to realize that a food product, which has been made for years, which is honestly labeled, which is nutritious and which has public acceptance may be barred from interstate commerce because of an administrative edict.

The basic fault, if it be a fault, lies not with the Food and Drug administration but in the law passed by Congress, although possibly the former could do something to make a manufacturer appearing at public hearings feel that he had at least a chance of winning his argument. Most manufacturers enter these hearings with the feeling they have two strikes against them before they start. If even one government witness testifies in favor of a standard and ten industry witnesses testify on the other side, the administrator may still decide with the one witness. There is nothing in the law that requires a decision in conformity with the preponderance of the testimony. A similar situation exists with respect to hearings held by the Federal Trade Commission. To correct it, a bill has been introduced in Congress requiring the decisions to conform with the preponderance of the evidence presented. In support of this bill, a New York lawyer stated that under the present system the only recourse open to industry at one of these public hearings is to "discredit" each and every government witness. If this be true, and many hold this view, it places the manufacturer of foods in a very unpleasant position.

Hearings on Corn Products

For example, a public hearing was called for March 18th to determine whether standards of identity should be promulgated for corn

products, such as meal and grits. Many nutritionists and persons with a sincere interest in improving the American dietary believe such standards will be beneficial and so testified. The American Corn Millers' Federation is also interested in better nutrition and almost two years ago passed a resolution pledging its support to efforts directed to improving the nutritional quality of all corn products. But there are very cogent reasons why federal standards will not improve the standard of corn products and may actually decrease the quality of the dietary in certain southern states. Therefore, in the interest of better nutrition the American Corn Millers' Federation opposed federal standards of identity for corn products. For the reasons given in the preceding paragraph, the millers were faced with the problem of whether to attempt to "discredit" all the nutritionists testifying for the government. Actually there was no disagreement between the two groups as to the need to improve corn products but there was disagreement as to how it should be done.

State Laws a Factor

The situation is this. Corn products are widely used in many southern states. In some low income groups, corn may be a very important source of calories. There are two general types of corn products: Whole ground, made largely by local mills and consumed near the point of manufacture; and degerminated corn made mainly by midwestern mills and shipped into the South. Both are deficient in niacin, the anti-pellagra vitamin. Pellagra is widespread in the South and some believe that if all the corn consumed in the South were enriched with niacin to the level of 16 mg. per pound a great step toward the elimination of pellagra would have been taken. Five southern states have passed compulsory corn enrichment laws but the compulsion extends only to degerminated corn products. Whole ground products are exempt.

Thus, the state laws apply almost entirely to product shipped from the Midwest and exempt the bulk of the home ground corn, which amounts to more than two-thirds the total consumption and may be as much as 90 percent in some areas. The Corn Millers' Federation argued that inasmuch as the bulk of the corn consumed was exempt from state laws and would be unaffected by federal standards, the pellagra problem would not be solved by federal standards and further, that such standards would work a hardship on many small mills by disrupting existing standards for corn products.

The proponents argued that because of the non-uniformity of state laws the term "enriched" does not mean the same thing throughout the South and federal standards would achieve uniformity in the interpretation of the state laws. This argument is true but it seems clear to many that where possibly only 10 percent of the total industry is affected, the promulgation of federal standards, with no fraud or alleged evil practice existent, is neither reasonable nor in the interests of honesty and fair dealing to consumers.

Standards Curb Improvements

It is also worthy of note that corn meal enriched with niacin was introduced into the South before any state law was proposed and there is evidence that the sale of enriched corn meal has been delayed by premature legislation. Many competent observers, both millers and nutritionists believe that the agitation for federal standards and the inclusion therein of the compulsory addition of riboflavin has been a distinct disservice to the cause of better nutrition in the South. Most members of the food industry are eager to improve their products, but improvements can best be achieved by individual initiative, involving consumer testing and trial and error processes. Compulsory enrichment legislation is not the way to better food. When fraud is present or when deleterious ingredients or unsatisfactory sanitary conditions are found, then "honesty and fair dealing in the interest of consumers" may be promoted by legislation or standards but real nutritional progress is not the fruit of administrative edicts. Against this viewpoint is cited the history of the flour standards. There are many answers to this argument but suffice it to point out that before enrichment of flour became compulsory 75 to 80 percent of all the nation's bread and family flour was being voluntarily enriched.[1]

There were many reasons why the corn millers opposed promulgation of standards but attention should be paid to their contention that standards constitute a definite threat to product improvement and research. Once a product has been standardized, the incentive for improvement has been removed, at least to a large extent. Barred from introducing improved products into an old established line, newcomers will hesitate to enter the field and thus competition is lessened. Under standards the newcomer, and oldtimer also, cannot offer a new, improved or better product, until it has been discussed at public hearings and new standards have been promulgated.

The history of the food industry has been a long succession of improvements. The addition of vitamins and minerals to foods was an industrial project. Even the word "enriched" as applied to the addition of vitamins to a food was coined by a food manufacturer. Now that industry has shown some of the improvements that can be made there is a rush to standardize. It is like a mother who exclaims over her four-year-old child, "She is so darling and cute. I wish she could always stay just as she is now." Of course, pro-

(*Turn to page* 220)

A recess in the hearing usually means that witnesses get together and compare notes.

All That's Left of German Chocolate Industry

Conversion demands and war's destruction seriously affected this industry. Prewar claims of superiority, however, although meriting consideration as to quality, were greatly overrated as to efficiency and progressiveness

By W. TRESPER CLARKE, Chief Chemist, Rockwood and Co., Brooklyn, N. Y.

THE end of the war with Germany found a rather formidable army of military and civilian observers, appraisers and consultants already in, and others prepared to go into the German homeland to make a rapid appraisal of Germany industry and resources. These preliminary investigations were not as complete as everyone had hoped they might be, due to chaotic conditions, which interfered with the full evaluation of German resources and their worth to the allied nations. A vast war had come to an end suddenly, with the German people completely unprepared for the defeat. The incredible damage to their cities, industrial centers, and even to the small, dispersed industries and the great loss of personnel made the problem even more difficult.

Sweets in Wartime Germany

It might be interesting to say a few words about the position sweets and chocolate occupied in the German wartime picture. The confectionery industry was drastically curtailed. Even through 1941 and into the latter part of 1942 some of the plants were forced to cease operating. Candy was a luxury and in wartime had very little place in the Nazi plan. Hitler's policy encouraged toughening of the German people by removing many luxuries or making them more difficult and expensive to obtain. Military canteens, however, did sell and distribute, free of charge in many cases, certain confectionery products. By 1944 civilian supplies were diminishing rapidly. Chocolate (as well as coffee) was and still is prized highly in Germany. Both played a major role as a commodity in the black market, and fabulous rates of exchange and barter worked to the benefit of black marketeers.

German Wehrmacht food supplies were quite different from those of the U. S. Army. In spite of the critical remarks made by some of our boys regarding K rations and other feeding packages, they were all glad to have the hard candies, caramels, beverage powders, bouillon powder, chewing gum, chocolate, cocoa and coffee preparations handy in time of need. Under stress they helped to feed more than just the body. They represented a tiny link that connected them with some of the little luxuries of peacetime life at home. Apparently, the Germans lagged far behind in this respect. The supply picture for them was very different. The Nazi viewpoint was different. It is, therefore, obvious that the confectionery and chocolate manufacturers of Germany did not do a job such as ours and could not have done so even if they had wanted to.

Industry Dispersed

Most German chocolate manufacturers also produced confectioneries. A few of the larger producers sold coating to smaller confectionery plants. It is easy to see, therefore, that the chocolate industry was more dispersed in Germany than it is in this country. Even in cases where two or three candy plants were operated by the same owners, within the same city or province, each of the branches produced chocolate liquor or coating. To our way of thinking, this is not the most economical way to operate.

Each small chocolate manufacturer and confectioner had his own roasting, cleaning and winnowing machines, and sufficent equipment to make his own requirement of chocolate coating. He even had equipment to press a portion of his chocolate liquor into cocoa butter and to convert the cake into powder. This policy supported a great equipment industry and made it possible to absorb large numbers of machines. Since there was such a dispersion of the industry throughout Germany, a larger portion of it survived than would have been the case had it been concentrated in such heavily damaged centers as Cologne, Berlin and Dresden.

Special Machinery

In Germany the most common method of roasting cocoa beans was by means of the Sirocco Rapid Roaster (Fig. 1) made by Barth of Ludwigsburg. This is a globe-shaped hot air roaster in which the beans are roasted and dehydrated by blowing hot air through them while they are in constant motion. It is neat and compact and is made in various sizes from 50- to 600-lb. capacities. Hot air is produced by burning gas or oil in a special burner. An interesting feature is that a predetermined moisture loss can be obtained. This is accomplished by setting the balance arm of the scale, on which the entire roasting drum rests, so that the hot, cooking air will be turned off when the mass of beans has lost a certain weight. After roasting, the drum discharges directly onto a table where the beans are cooled by a forced draft. A light roast seems to be desirable to most German chocolate manufacturers when they are making a coating, but usually a high roast is selected for cocoa powder.

Stone grinding mills are to be found in most plants, but some have eight-roll liquor refiners made by Buhler and Lehmann. The first feed rolls are for cracking and flaking the nibs. The production on these mills was extremely low, around 200 to 300 lb. per hour. One reason for

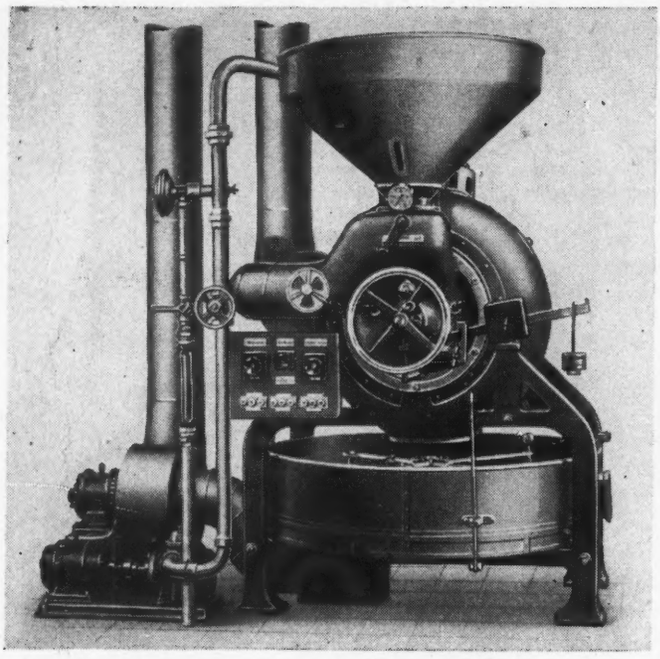


FIG. 1. The Sirocco Rapid Roaster has a global drum in which the beans are roasted by a blast of hot air that is forced through them while they are in constant motion. The hot air is produced by burning gas or oil in a special burner, or in a stove fired with coke or brown coal. The degree of heat is closely controlled by regulating the gas or oil, or by the hot air blending devices when other fuels are used. The roaster exhaust consists of a blower connected with a cyclone separator, which collects any nib or shell blown over with the exhaust. There is practically no danger of scorching or burning.

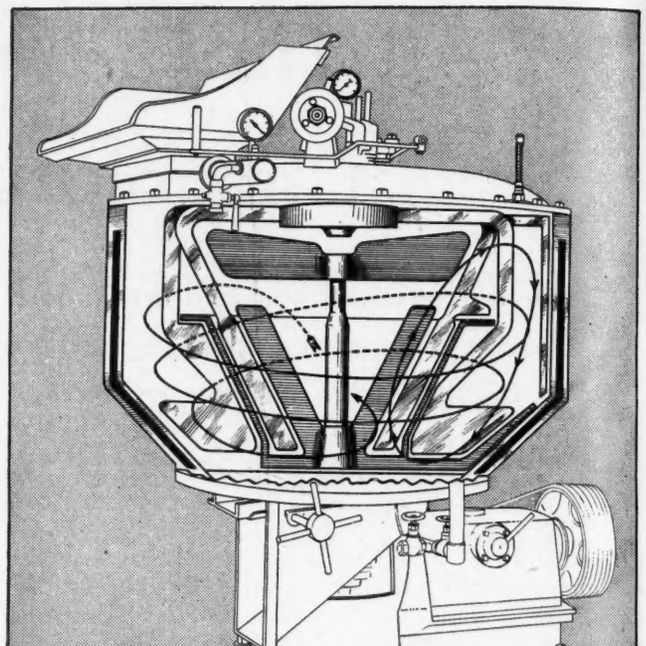


FIG. 2. The Petzholdt Round Conche may be likened to an egg beater in that the masses of chocolate are kneaded vigorously between the sides of the machine and the moving and stationary internal parts. Another type makes use of conical stone rollers.

this was the very high quality grind of the chocolate liquid produced. It must also be remembered that in the smaller plants an enormous production rate was not required.

Conches made by Petzholdt (Fig. 2) were to be found in a few of the larger plants. These machines are circular and equipped with blades or stone rollers that revolve and splash the chocolate while blasts of air blow through it. This conche is also designed for use with vacuum. Still another type is the Lehmann Umlauf conche (Fig. 3) which consists of a cylindrical drum turning on horizontal supporting rollers. It has internal scapers and beaters so that the chocolate can be well aerated and heated. Many of these odd designs presented mechanical problems, the solution of which presented still other problems and, when these were solved, the result was a very cumbersome and complicated piece of equipment. It seems safe to say that our American machinery is capable of good operating efficiency and that we do not have much to learn from the German industry.

Terrible Destruction

Many who have seen the German industry in normal times, in what the Germans refer to as "Friedenzeit," would be shocked to see some of the terrible destruction that has fallen on certain plants. For example, in Magdeburg practically all of the plants of any importance were damaged or completely destroyed. In Halle, the plant of the Most Chocolate Works on the Saale River suffered very little damage. In the same city, however, one of their plants was damaged to the point of abandonment. In Leipzig, the famous Felsche firm, which operated two plants and maintained a warehouse in a third section of the city, was hit at all three places. Much of their confectionery manufacturing facilities in uptown Leipzig was destroyed. Revolving pans and depositing machines were hanging half on and half off the floors, which swung down when the walls collapsed. By a streak of luck their chocolate manufacturing section was only slightly damaged, and it operated until the end came. It even operated for the American occupying forces until the Leipzig area was incorporated in the Russian zone.

The Stollwerck plant, in Cologne, although hit, was not as badly damaged as you might suspect. The Sprengel plant in Hannover, the Schoko-Buck plant in Stuttgart, the Mauxion plant in Saalfeld and the A. G. Bohme plant in Delitzsch were either untouched or only slightly damaged. The Schokinag plant in Mannheim was a total wreck two years ago following an incendiary raid. Even in August 1945 the damage had not been cleaned up. Some plants went out of business or ceased to exist as confectionery plants. Others in Bremen and Hamburg, and as far east as Hannover, closed down because of bombings.

One of the neatest plants was the Hanseatenwerke in Bremen. It was untouched by war until the last day of German resistance. Then a single small artillery shell pierced the wall but failed to go off. Shortly thereafter the place was looted of whatever chocolate was left in the conches and other equipment by newly liberated displaced persons. After this, the plant experienced a deadly quiet, which probably has not been broken.

Plants Converted

During the war several chocolate plants were converted to dormitories for skilled workers in nearby war industries, others were turned into hospitals, one became a rest home for war casualties. Several converted a large percentage of their floor space into machine shops. One of the finest in Germany, the Mauxion plant in

Saalfeld, leased a large portion of its beautiful plant to a motor manufacturer and supplied electric power from its small hydroelectric plants on the Saale River to electroplate airplane parts. Another in Delitzsch became a U. S. military billet and headquarters. Still others undertook such unusual activities as dehydration, flour milling, rape seed oil production, synthetic honey and, above all, soup mixture manufacture. Nearly all German confectionery and chocolate plants manufactured the so-called "Bratlingspulver" preparations, made with and without dehydrated onions, which changed the atmosphere of a chocolate plant considerably.

Supplies

As for supplies, the confectioner had a fair amount of sugar throughout the war. The Czech, Polish and German beet sugar fields were relatively safe. Some sugar refining plants were hit, but there were others to carry on production. Germany depended upon Argentina for a supply of wheat and corn to convert into starch sirups. In wartime, however, she concentrated on her own potato starch and the inferior corn from Romania and Bulgaria. Thus, starch sirups were greatly reduced in quantity. One of the largest starch plants located on the Elbe would still have been able to operate after minor repairs provided sufficient raw materials had been available.

Apple sauce and grape pastes, Italian raisins, dried prunes and cherries made up a large part of the confectioneries that survived the war. Dehydrated eggs came from the Balkan nations. The shortage of oils and fatty products brought about a greater use of rape seed, Russian sunflower seed, poppy seed, hazel nuts, fruit pits and other seeds. Marzipans were made with hazel nut meal, chestnuts and occasionally pignolia nuts. There were not enough soy beans available to meet the demand. Besides, proteins were more important in other food stuffs. Milk powder appears to have been available in small quantity. Several German plants still used concentrated skim milk in chocolate-flavored beverages for hospital consumption. Even bread crumbs were used to fill up fruit paste bars, which were quite popular in the military canteens. Aside from the weak natural flavors these constituents had, it must be stated, with some disappointment, that the synthetic flavors used in confectionery work were very poor. Frequently these fruit bars were rolled in sugar and dipped in thin hot water icings or sugar glazes.

Cocoa Shortage

The German chocolate industry naturally suffered from shortage of cocoa beans, even from the start of the war in 1939. As far back as 1933, the Nazi economic control began to operate to put the country on a self-sufficient basis. As Germany does not produce cocoa beans it was necessary that she import her entire requirement. The blockade around Hamburg and Bremen curtailed such imports, but it appears that she had a large supply of beans at the outbreak of the war. After the fall of the Low Countries and France, their stocks were confiscated and taken into Germany. This loot helped to delay the final closing of German plants in some cases until a few months before the end of the war. As Russia never consumed cocoa beans to any great extent, they could not supply similar loot when their territories were overrun. By careful stretching of supplies, and using them almost entirely in military goods, at least three of the German plants that I saw were able to continue to operate even after V-E day.

After the severe bombing of Hamburg, the chocolate plants in the west were ordered to send their cocoa beans and some equipment to Berlin and Leipzig. Hannover and Bremen sent supplies eastward to avoid destruction by the advancing western allies and by bombing. These measures came too late. Supplies were withdrawn too far east and were eventually lost to the Russians.

A system of quotas was set up before the war to provide shares of beans to each manufacturer. Some manufacturers transferred their contingent to others, who in turn processed them for their own use. Some operators were forced to sell their holdings, plant equipment and quotas to new owners who could meet the Aryan requirements for a charter.

Personnel Problems

The personnel problem became far more acute than any we experienced in America. The regular employees were reduced by approximately 50 percent from 1939 to 1942. They were more important as work-

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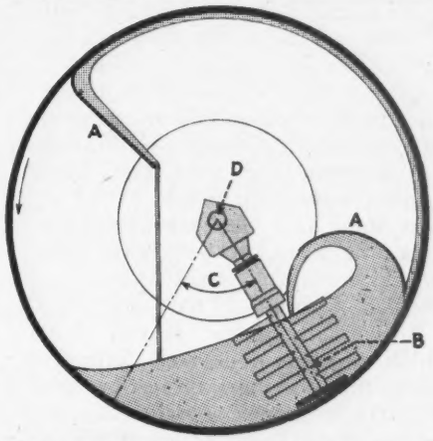


FIG. 3. Schematic drawing showing operation of Lehmann Umlauf Conche. The stationary scrapers A remove the chocolate from the inner surface of the revolving drum. A set of agitators B, which reciprocate through the arc C, are mounted on the central shaft D.

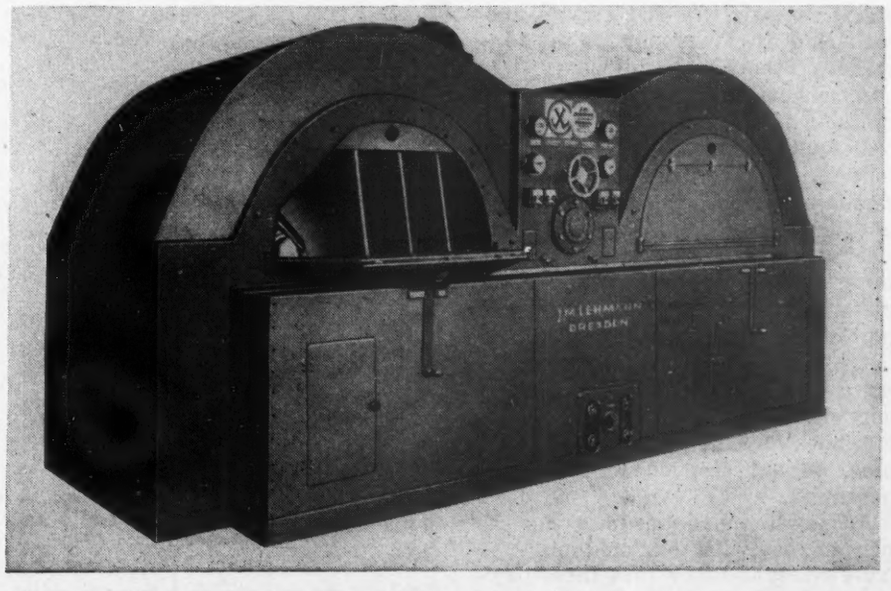


FIG. 4. The Lehmann Umlauf Conche is built in several types, either with a single drum, or a pair of rotating drums. Each drum has internal scrapers and mixers that continuously work and knead the mass of chocolate as the drums revolve. Sizes run to 2,500 lb. per drum.

Folic Acid Takes Its Place In the Vitamin B Series

Nutritionist sees enhanced importance of fresh foods containing new dietary factor, valuable in the treatment of pernicious anemia. Discoverers of its chemical constitution are making plans for large scale synthetic production

By HALDANE GEE, Assistant Editor, "Food Industries"

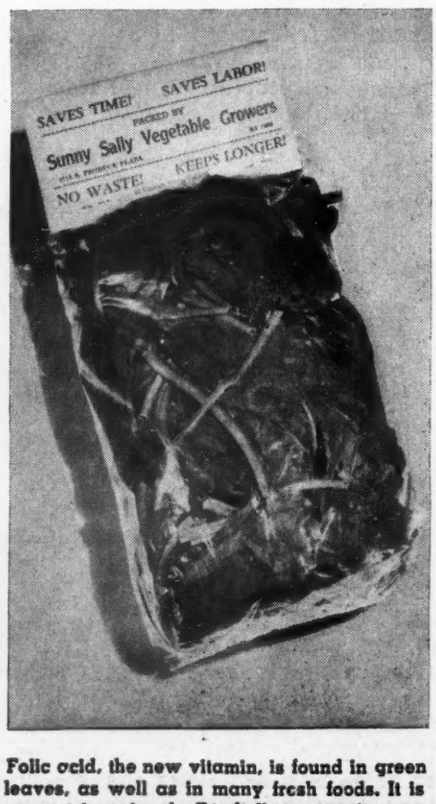
SYNTHETIC production of folic acid completes the chemical picture of a relatively new member of the B family of vitamins of importance to the food industry. Successful synthesis of the new vitamin was first announced a year ago, when samples were made available for experimental use. The structural formula was disclosed last May, when the synthetic folic acid was proven identical with one of nature's forms.

Present in green leaves, from which its name is derived, folic acid affects many animal tissues, but particularly the bone marrow. It is essential for the development of the red and the white blood cells. If monkeys are given a diet deficient in folic acid, they soon display symptoms like those of the tropical disease of sprue in humans, characterized by anemia and diarrhea. Folic acid is essential for the growth and feathering of chicks and for the formation of their blood pigment.

In concentrated form or as pure crystals, folic acid is being used medicinally instead of liver preparations for the treatment of pernicious anemia because it is specific for blood cell formation, if the diet is otherwise adequate. Several other varieties of anemia, in which the red blood cells are too few and too large, are improved by adding folic acid to the diet. This anemic condition may occur in pregnancy and may accompany pellagra. Some forms of anemia, however, usually secondary anemias, do not respond to folic acid treatment.

Although the immediate enrichment of food with folic acid might be expected, it is likely that these newest discoveries will first add to the desirability of fresh fruits and vegetables as articles of diet. Additions of folic acid to cold processed foods may next be expected, along with close control of the amount in frozen foods. The possible addition of folic acid to heat processed foods is complicated by the fact that the material is only moderately heat stable in the presence of other substances. One practical use already made of the new knowledge of this vitamin has been a survey of the folic acid content of prepared army rations.

Proving the structure of the folic acid molecule and demonstrating its powerful biological effects are comparable in importance with the discovery of thiamine, first of the B vitamins to be isolated. After the first seven or so members of the B family had been isolated—work which started about 25 years ago—it was found that a purified diet, low in vitamin B complex, caused anemia to develop in experimental animals unless the diet contained in addition another factor or vitamin found in such natural sources as yeast, liver or alfalfa. By 1935, it was recognized that monkeys on a highly refined diet displayed a low blood cell count, one of the characterisics of the sprue-like disease. This condition did not respond to any of the B complex vitamins then known, but it did respond to the new factor. Its importance for the nutrition of chicks was suggested in 1938 and was confirmed a year later.

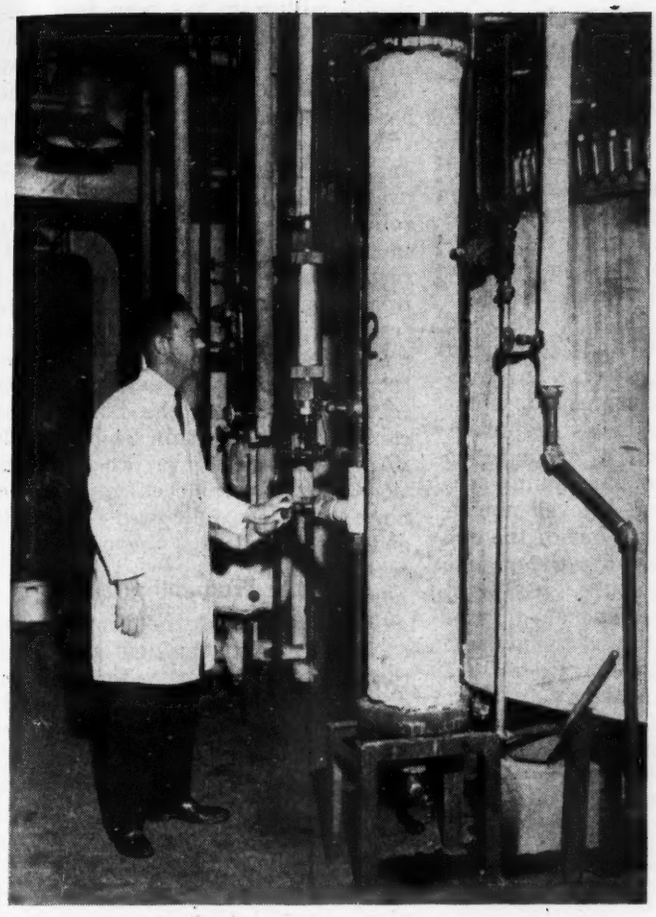


Folic acid, the new vitamin, is found in green leaves, as well as in many fresh foods. It is present in spinach. Fresh liver contains one form of the vitamin. Yeast contains another.

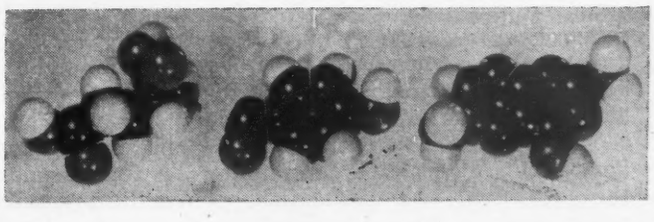
Synthesis Achieved

In the past five years, information on the new dietary factor accumulated rapidly. Increasingly powerful preparations were obtained as the work of concentration and purification went on. Apparent discrepancies in the results of medical use were explained away. The active material was shown to differ, depending on which natural source it came from. A chemical structure was proposed for the simplest form of the folic molecule, which resulted finally in synthetic preparation and proof that the synthetic product is identical with the simplest natural form of folic acid. At least two other forms have been recognized.

Accelerated progress has been due in large measure to the scale and intensity of effort of the organic chemists at work on the project, and to the close cooperation of at least five nationally known medical teams who

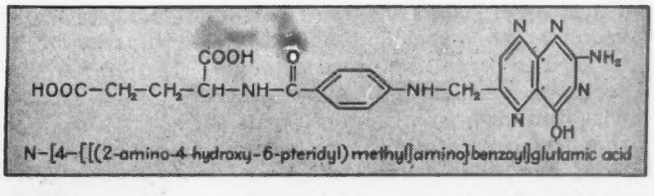


(Above) Brian Hutchings, one of the Lederle Laboratories group who worked on the synthesis of folic acid, inspects a fermentation unit that produced five grams of natural vitamin in a long process and at a cost of $2,000 a gram.



(Right, top) M. E. Hultquist, of the Calco Chemical Division of American Cyanamid Company, puts together a stereo model of the folic acid molecule, following the structural pattern he helped to work out. This is the form found in liver.

(Right, center) Partly disassembled stereo model of the liver form of folic acid showing the three main groupings. Glutamic acid chain is shown at the left, the 6-sided para amino benzoic acid ring in the center, and the double ring of the pterin group at the right.



(Right, lower) Chemical constitution of the folic acid molecule, as revealed in Science, May 31, 1946, by a collaborating group of 16 investigators who first purified natural material, next determined its chemical makeup, and then made it synthetically.

have been carrying on the clinical investigations. The fast pace is in line with the speed of nationally organized research so successful during the war years, of which still more examples may be expected in the future.

Meetings and publications on folic acid in recent months are evidence of the current interest in the new vitamin. A three-page review article appeared in the April issue of *Nutrition Reviews*. In May, the New York section of the Institute of Food Technologists heard a paper on "Some Newer Aspects of the Nutritive Quality of Food," by Dr. C. Glen King, scentific director of the Nutrition Foundation and nationally known nutritionist. Dr. King devoted a large part of his paper to the folic acid development. An all-day conference on folic acid, arranged at the end of May by the New York Academy of Sciences, was attended by more than 400 members and visitors, who heard reports from the scientific staff of Lederle Laboratories, including the first formal announcement of steps by which they had established the chemical structure of folic acid. They also told how synthetic production had been achieved. A number of those who had taken the lead in the medical use of the material were also on hand with reports. This conference was timed to coincide with the publication in *Science* on May 31 of a report on folic acid, which included a disclosure of the formula and summarized the findings of 16 investigators,* 8 working at Lederle Laboratories, and 8 others working at the affiliated company, Calco Chemical Division of American Cyanamid Company.

*The 16 associates who worked out the structure and synthesis are Robert B. Angier, James H. Boothe, Brian L. Hutchings, John H. Mowat, Joseph Semb, E. L. R. Stokstad, Y. SubbaRow and Coy W. Waller, of the Lederle Laboratories, and Donna B. Cosulich, M. J. Fahrenbach, M. E. Hultquist, Erwin Kuh, E. H. Northey, Doris R. Seeger, J. P. Sickels and James M. Smith, Jr., of the Calco Chemical Division, American Cyanamid Company.

C. Glen King, scientific director of the Nutrition Foundation, predicts a series of rapid developments relative to folic acid and other new members of the B vitamin complex.

Other names used for the new diet factor in the past include vitamin M, vitamin B_c and *L. casei* factor. Vitamin M was the factor missing from the refined diets in the experiments on monkeys. Vitamin B_c was given as a name for the chick anti-anemia factor, isolated from liver. The designation *L. casei* was used by reason of the essentiality of the material for maximum growth of the microorganism *Lactobacillus casei.* The response of this microorganism is so direct that it can be used as a method of assay for folic acid, as was actually done in the later stages of the chemical work. This technic is similar to the use of microorganisms for the detection and estimation of amino acids in other investigations. The growth requirements of certain bacteria are so specific that they can be used to reveal the presence or absence of chemical substances otherwise difficult to analyze for. Tests of this kind are not difficult to make.

Of the related folic acids or *L. casei* factors, the two which had been obtained in pure crystalline form were most used in the final phases of the work. One, the liver *L. casei* factor, was derived from liver preparations such as were used in the treatment of anemia. This form was found to have the simplest chemical structure, and is believed to be the most active form for the treatment of disease. It will be made synthetically on a large scale. Another *L. casei* factor, prepared by a fermentation process, was found to be chemically similar to the liver factor although it was a little more complex. A third form of the factor was isolated from yeast, and was found to be still more complex.

Molecular Structure

To establish the composition of the folic acid molecule, the chemists followed the recognized path of purification of material from natural sources, isolation of the factor in crystalline form, breakdown into its structural components, and synthesis for the purpose of verifying the formula. The name of the compound in the form in which it occurs in liver is pteroyl glutamic acid. At one end of the formula is the double ring of the pterin group. Pterin, a previously known yellow compound, is one of the coloring materials of butterfly wings. The central grouping in the formula is the para-amino-benzoic acid ring which enjoyed notoriety a few years ago as one of the two proposed dietary agents thought to be protective against the graying of hair. The third component in the folic molecule is the glutamic acid chain, one of the commonest alpha amino acids of natural protein. The type of folic acid formed by fermentation has three molecules of glutamic acid as well as the ring structures. Folic acid from yeast has been found by Parke Davis investigators to contain seven glutamic molecules. In working out the relationships between the different forms of folic acid, the investigators were able to convert the fermentation factor into the liver factor, which released glutamic acid.

As with other biologically potent materials, the effective dose is small. A few gammas, or thousandths of a milligram, sufficed in many of the animal experiments. Chicks were found to respond to 25 gammas. In the case of humans, a dose of less than a milligram has been found effective if given by intravenous injection. Up to five milligrams may be required by mouth. The drug has been found singularly free from toxic effect in doses far in excess of the amounts in which it is likely to be used. In addition to being powerful, folic acid also acts rapidly, especially in the case of the "maturation" effect—so named from its influence on immature blood cells. When used to treat pernicious anemia, it can cause a higher count of mature red cells in the blood within four days. Changes in the marrow of the breast bone can be detected within 24 hours. It it believed there are other indications of a favorable effect in a few hours after the folic acid enters the body.

Quantity Production Planned

Perhaps one of the best indexes of the future of the new vitamin is the scale planned for synthetic manufacture. Past production, necessarily laborious, has been in amounts of milligrams and grams. Pilot equipment is now handling pound lots. American Cyanamid is building a large commercial plant at Willow Island, West Virginia, which will be operated by the Calco Chemical Division. Partial operation of this plant is scheduled for January, with full production as soon as possible afterwards. Officials of the Lederle Laboratories are optimistic as to the future of the material. It is understood that, in addition to the successful treatment of pernicious anemia, there is reason to hope for promising results with the secondary anemias, on the basis of extensive clinical

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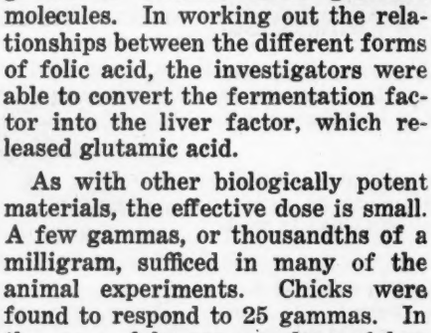
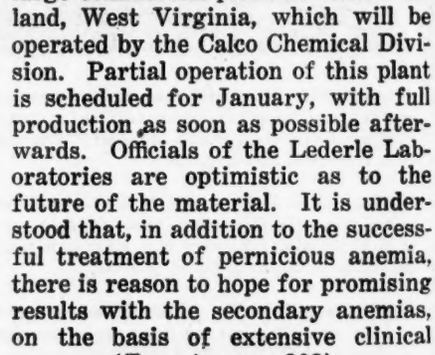




Two of those who directed the efforts of the biochemists and organic chemists who built the folic acid molecule are shown above. Y. SubbaRow (left) is director of research of Lederle Laboratories. E. H. Northey (right) is now administrative director of Stamford laboratories of American Cyanamid Co. Cyanamid is building a plant in West Virginia for the large scale synthetic production of folic acid.

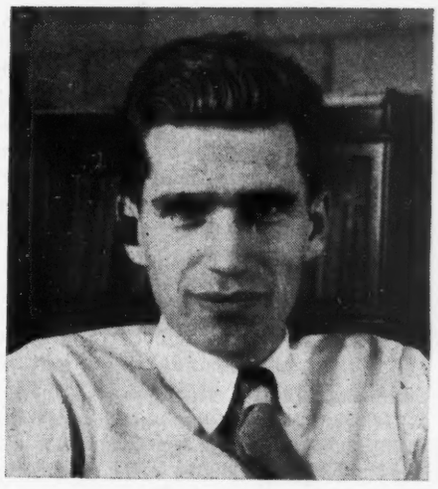
Statistical Control Of the Production Process

PART I—How to make a control chart, the foundation stone of quality control. It is a plot of sample averages on graph paper. Used on a weighing operation, it keeps track of performance, reveals errors and can even forecast trouble

By A. M. MOOD, Research Associate Professor
Statistical Laboratory, Iowa State College, Ames, Iowa

DURING recent years, the manufacturing industries have adopted statistical methods of quality control on a large scale. The methods were developed primarily by production engineers and statisticians of the Bell Telephone Laboratories and were designed for the mass production manufacturing industries. The fundamental ideas are, however, quite general and may be applied to any repetitive process, whether carried out by machinery or labor or a combination of both. In particular, it is reasonable to suppose that the methods would be fully as profitable to the food industries as they have proved to be in the manufacturing industries.

Before looking at the methods themselves, it may be worthwhile to consider briefly what is meant by quality. There is, of course, no need to justify quality control, however it is achieved. It is well known that uniform quality is the best protection for a brand name. The housewife who opens a can of peas to find it contains beets, or finds that a can of apricots contains largely sirup with exactly two apricots will avoid those brands thereafter. Production processes that allow such lapses of quality (and there are many of them) cost far more than the expense of correcting their defects. On the other hand, there are production processes that are too expensive. They make the product more uniform than it needs to be, and a much less expensive process might do a perfectly satisfactory job for all practical purposes. In short, the proper quality level is neither high nor low, but is determined by the use or the market to which the product is directed. Once the quality level of the product is thus specified, together with the allowable variations, the best production process is one that produces that quality with the allowable variation. A process that produces the quality with smaller variation is ordinarily more expensive than it need be, while an inexpensive process, which may produce the specified quality level on the average but with great variability, will fall below the lower quality limit from time to time and will ultimately reduce the demand for the product.



A. M. MOOD

We shall, for the moment, assume that the quality levels are specified, although in practice, quality control data provide a useful tool in setting up specifications. The specifications may be in terms of weight, flavor, color, proportions of constituents, proportion of pieces with blemishes and vitamin content. All specifications are given in terms of upper and lower limits. Thus, a can of string beans might be required to have (1) a net weight of 18 to 19 oz., (2) weight of fluid 2.0 to 2.5 oz., (3) number of crushed or broken pieces—0 to 3, (4) number of pieces with minor blemishes—2 to 5, and (5) color—dark green to light green but with no yellow tinge. There might be as many as 25 or 30 such quality specifications. It is the duty of the quality control engineer to keep the product within these specification limits.

Quality Control Program

A complete quality control program falls naturally into three major divisions:

1. Process Control
2. Quality Determination
3. Research

Process control, as the name implies, refers to control of the production processes in the plant. The product quality is indirectly controlled by keeping the processes themselves under close control. Quality determination refers to inspection, and is usually employed at the beginning of the production process in order to control the quality of incoming material, and at the end of the process in order to check the quality of the final product. Research refers to experimental work done in discovering and eliminating causes of variability. The order in which these three functions are given reflects their importance. The major task of quality control is to keep the production process in hand, to correct it as rapidly as possible when it gets out of control, and even to anticipate difficulties before they occur. Inspection is an important factor in quality control, but after the control program is set up and in good operation, inspection becomes mainly a routine procedure.

The quality control methods have been referred to as statistical. This does not mean that a professional statistician must be engaged to use

the methods. It merely refers to the fact that the technic employed by the quality control engineer is based on statistical theory, or the theory of probability. By far the most important statistical tool is the *control chart* which is easily understood with no technical knowledge at all of statistics. The control chart is the only essentially statistical technic required in process control.

Quality determination requires somewhat more elaborate statistical tools, but these have been simplified and systematized so that they may be readily applied by persons with no formal training in statistics. These methods will be described in a later issue of FOOD INDUSTRIES. Only in the research program may a professional statistician be needed; here his primary duties would be to design the somewhat complex experiments that are often necessary to uncover sources of variation in the production process, to devise modifications of standard control technics both in process control and in inspection when the standard technics cannot be well adapted to certain processes, and to review periodically the control data accumulated in the plant with a view to recommending improvements in the control program.

Personnel Needed

Personnel are needed to carry out a complete control program. The quality control engineers are generally persons with engineering training who have had several years' experience with the production process. They must be entirely familiar with the process as a whole and in all parts. These men would rank somewhere between the plant's general manager and the foremen. It is worthwhile to use men who like to tinker with the process, that is, who have an idea now and then about some minor variation that may improve the performance of the process. It is surprising how far such a man can reduce variability of quality.

Subordinate to the quality control engineers are several assistants. The number of these varies widely, depending on the amount of routine work done in connection with the control program. A small plant may have one engineer and anywhere from one to a hundred inspectors, chart keepers, samplers, etc. A plant that needs as many as four or five engineers would probably find it profitable to employ a statistician. With a fewer number of engineers, a consulting statistician brought in time to time could normally take care of all the statistical problems that arise.

Control Charts

Coming now to the control chart—which is the foundation stone of quality control in general, and of process control in particular — the reader should be warned against expecting any revelation. The device, in fact, appears so ludicrously simple that it seems impossible that it could accomplish such spectacular gains as have been claimed for it. The control chart is simply a plot on graph paper of a series of sample averages.

As an illustration, let us suppose that a control chart is to be run on a machine that is filling 2-lb. bags of coffee. We are interested in checking the weights that have a quality specification of 32 to 33 oz. The machine is set at 32.5 oz. and is supposed to weigh correctly to within half an ounce. The bags weigh 2 oz. with very small variability, say ±.04 oz. The weights are checked by taking five bags off the production line every half hour and weighing them to within one-tenth of an ounce on a sensitive scale. The average of the five weights is then plotted on a chart. After a few days, the chart looks something like the upper sequence of points in Fig. 1. Most of the points fall between 34 and 35 oz. as they should, taking into account the 2-oz. container weight. Two points are badly off on the morning of the second day, but it was discovered that the weighing control had gotten out of adjustment, and this was easily corrected. On the third day, the points were somewhat low during the morning, though no assignable cause could be found for it at the time. Later it was discovered that a batch of lighter weight paper bags had been used that morning due to an error on the part of the supplier of the bags.

Having obtained some preliminary data, we are now prepared to determine what are called *control limits*. These are statistical limits based entirely on the data; the specification limits are not involved here. The first step is to discard all data involved in questionable looking points provided an assignable cause of variation has been found. But points that look badly off must be included if no cause for their being off has been discovered. In the example of Fig. 1, discard the weights of the first four samples on the second day (the adjustment having been made before the fifth sample). The weights of the samples on the third day that involved the lighter weight bags are increased to correct for the difference in bag weights, about 0.38 oz. in this case. Now compute the average of all the sample averages. This is called the *process average* and is usually drawn as a horizontal line on the control chart. It appears as the central line of Fig. 1 at 3447.

Calculating the Range

The control limits are computed from the individual weights of the separate samples. For each sample,

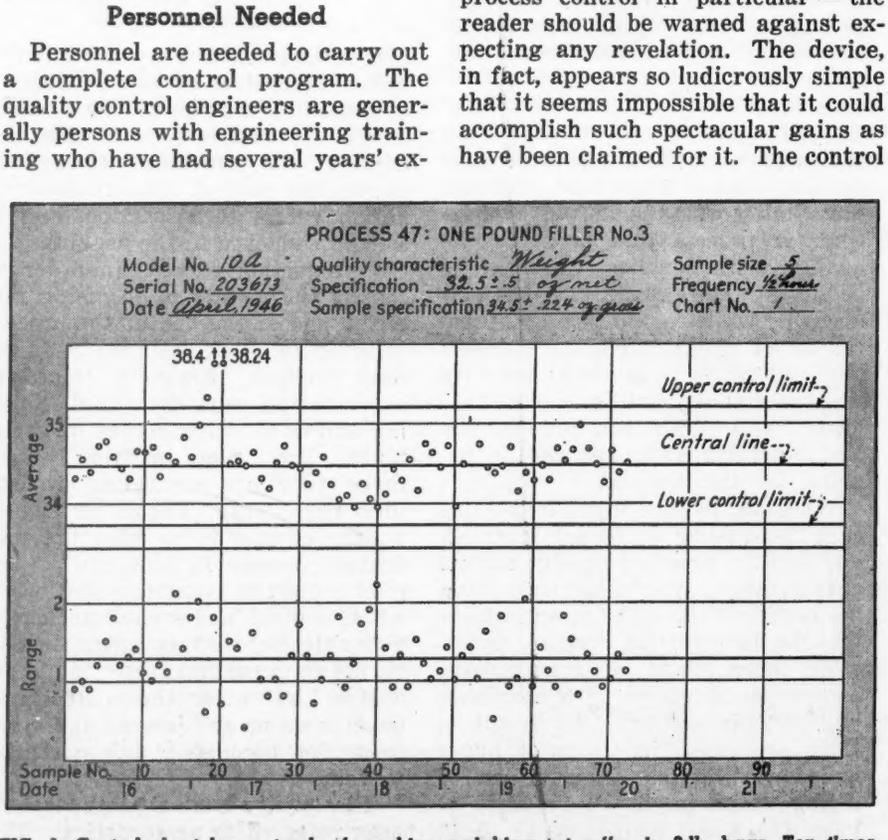
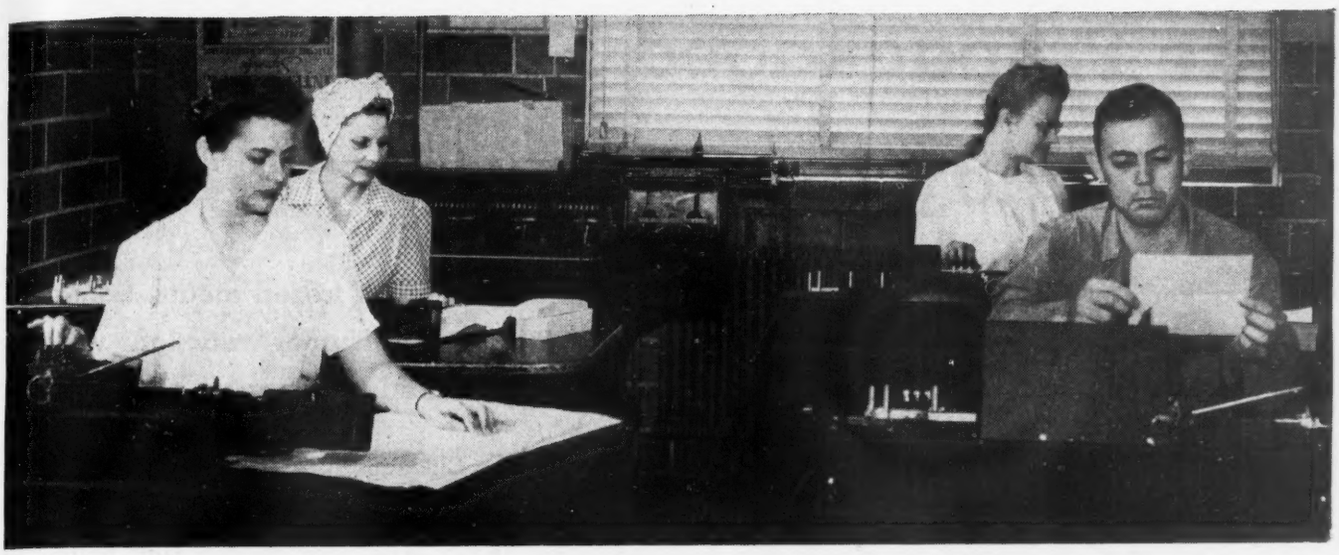


FIG. 1. Control chart keeps track of machine weighing out coffee in 2-lb. bags. Ten times each day the operator enters the average weight of five bags on the chart. Errors in weighing or changes in packaging material will cause abnormalities in the charts.



Punched card electrical tabulating equipment is used in the statistical laboratory of Iowa State College. Statisticians and technicians work out simplified factors and formulas, which have universal application in quality control investigations.

the *range* is calculated by subtracting the smallest of the five weights from the largest. Thus the individual weights for the first sample plotted on the chart in Fig. 1 are: 34.6, 33.9, 34.7, 34.5, 33.8. The range for this first sample is 34.7—33.8=0.9. Now calculate the average of all the sample ranges, which in the present example turns out to be 1.28. This number is multiplied by 0.577 (a figure determined from statistical theory) to get 0.74. This is the distance of the control limits from the central line. That is, the control lines are at 34.47+0.74=35.21, and at 34.47 — 0.74 = 33.73. These are shown in Fig. 1.

The figure, 0.577, given above, depends on the sample size. Table I gives these factors for the commonly used sample sizes.

The factors multiply the average range to give the control limits for samples of given size. In order that the control limits be accurately estimated, it is desirable that the average range be computed from a large number of samples. The minimum number is usually given as 25. In the illustration used above, there were 68 samples available after seven had been corrected for light bag weight.

If any change is made in the process, no matter how minor, new control limits are determined after first collecting a new set of 25 to 30 samples representative of the revised process.

The statistical significance of the control limits is simply that the sample averages should fall between them if the process remains the same. When a point falls outside the limits, that is taken as prima-facie evidence that the process has been disturbed, and one takes immediate action to discover and remove the disturbance. As a matter of fact, it is not impossible for a sample average to fall outside the limits when the process is unchanged, but the probability of its doing so is very small — about one chance in 400. Thus, there is a small risk that one may be looking for trouble that does not exist when an average falls outside the control limits. To decrease this risk by expanding the limits would, however, increase the risk of overlooking disturbances that did exist. The choice of a 1 in 400 risk in the limits is dictated more or less by past experience in quality control work. These limits are almost universally accepted now as a satisfactory compromise between the two risks that must be taken.

Constructing the Chart

To recapitulate briefly the construction of a control chart:

1. Collect some initial data in the form of periodic small samples.
2. Discard any data known to have arisen when the process was disturbed. The remainder of the data is then taken to be representative of the normal operation of the process.
3. Calculate the process average and the control limits, and draw horizontal lines representing them on the chart.

TABLE I—Control Limit Factors

Sample size	Limit factor
3	1.023
4	.729
5	.577
6	.483
7	.419
8	.373
9	.337
10	.308

Use of the Charts

The use of the control chart grows with experience. The primary advantage of the chart is that it is quite sensitive to small changes in the production process. Any gradual change that might ordinarily go unnoticed for some time will be shown up immediately on the chart, and corrective action can be taken before any serious trouble occurs.

In the beginning, the chart is used mainly to check on the process. As long as the points are within the control limits, the process is assumed to be operating satisfactorily, and when a point falls outside the limits, the process is halted and the cause of the disturbance is rooted out if at all possible. Most quality control engineers agree that it is worthwhile to stop the production process altogether when the chart shows it to be out of control, even though it may be expensive to do so. In the first place, the process may well be making defective products that would have to be scrapped or reworked anyway. Secondly, the effect on the operators is good in that they will be likely to pay close attention to their duties when they know that some minor oversight on their part may hold up production.

In his further discussion of statistical control of the production process, Professor Mood will enlarge on the use of the control charts and will tell how to set up a quality control program. This presentation will appear in the next issue of FOOD INDUSTRIES.—*The Editors.*

Are Prepackaged Frozen Meats Ready for the Retailer?*

One packer has a new line of prefabricated, prepackaged, quick frozen meats. Some items are for sales testing, others for actual distribution. Consumer reaction will determine the trend. How will the operations of packers and retailers be affected?

By F. W. SPECHT, Vice-President, Armour & Co., Chicago, Ill.

ARE prefabricated and prepackaged cuts in the meat packers' program? Before answering this question, prefabricated and prepackaged meats must be defined. But first, in the interest of simplicity, the term prefabricated should be dropped, because if it's prepackaged, it's got to be prefabricated.

Some think of prepackaged meats as quick frozen meats. Others think of prepackaged meats as fresh red meats, such as steaks, chops, roasts and the like. Still others have in mind prepackaged cured and smoked products, such as sausage, luncheon goods, loaf goods, ham, bacon and dried beef. I believe most of us are interested primarily in quick frozen meats. So let us dispose briefly of the other two before discussing prepackaged quick frozen meats.

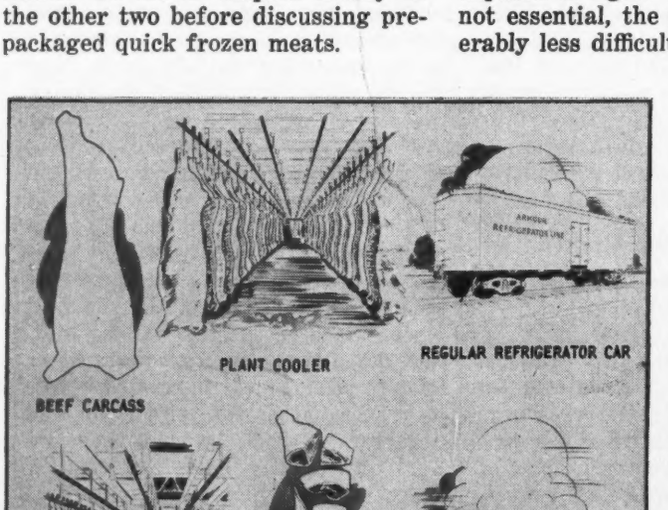
There is a possibility that the packer will eventually offer an extensive line of prepackaged cured and smoked products. Most leading packers already have many items that fall in this category. Many of the products include sliced bacon, sliced dried beef, pork sausage, short summer sausage, brick chili, bacon squares, smoked pork shoulders, butts and picnics.

Meat packers will continue to expand their activities in prepackaging these and similar types of meat products. If transparency is essential, the extent of this development may hinge largely upon advancements in adequately protecting these products from discoloration when exposed to light. If transparency is not essential, the problem is considerably less difficult.

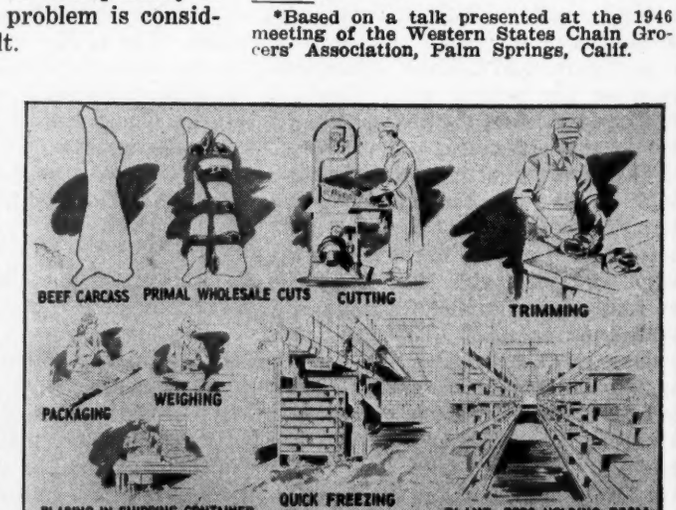
The chief problem with prepackaged fresh meats is in maintaining the quality and fresh appearance of the product, particularly when exposed to light. New and improved packages and packaging technics may be developed to maintain the quality and appearance of fresh meats for extended periods. But, on the basis of our experience to date, and the difficulties that confront us in preparing and handling fresh red meats in prepackaged retail cuts, we do not see the possibility of undertaking an operation of this kind.

Possibility of the success of the prepackaging operation is greater, the closer this operation is to the point of final sale. Fresh red meats in prepackaged form must be turned

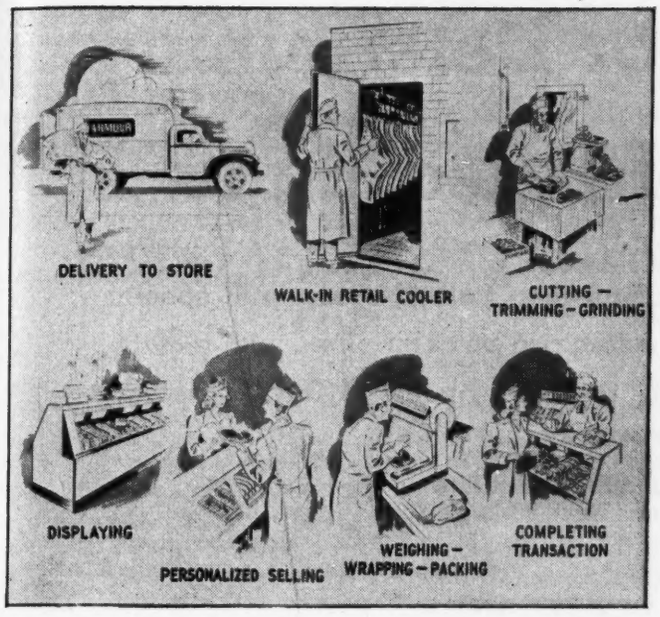
*Based on a talk presented at the 1946 meeting of the Western States Chain Grocers' Association, Palm Springs, Calif.



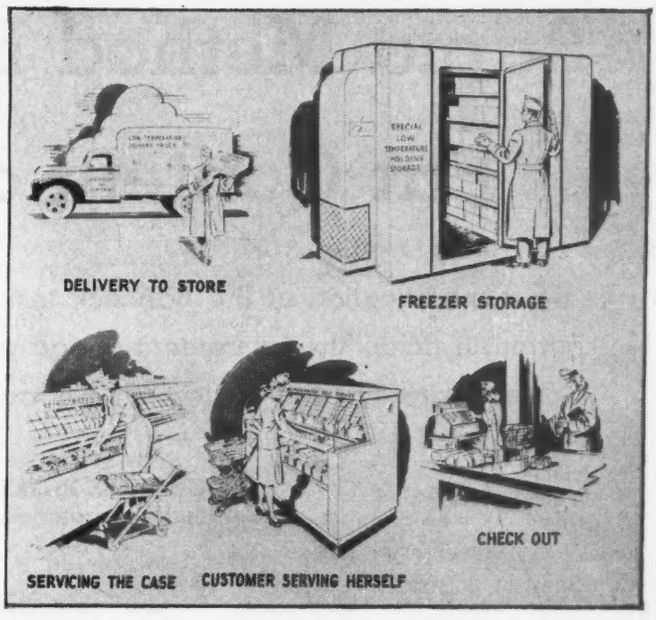
How meats are processed and distributed by the meat packing industry at the present time. Fabricating is done by retailers.



Steps that would be required by the packer to prefabricate, prepackage, quick freeze, store and distribute meats.



How meats are now being handled by the retailer. Meats are cut, trimmed, weighed and packaged by the butcher.



Prepackaged frozen meats would change the retailer's method of handling and merchandising. Present equipment would be obsolete.

over quickly, and their appearance and condition must be watched very carefully. If the retailer is willing to assume the responsibility of prepackaging and all that goes with it, it is possible that he can do this job with some success. But, the possibility of a big packer, like ourselves, getting into the prepackaged fresh red meat business, looks remote.

Prepackaged Quick Frozen Meats

Much has taken place in the quick frozen field, particularly in recent years. New freezing and packaging methods have been perfected. Frozen fruits and vegetables have become a successful industry. Locker plants have been growing by leaps and bounds. The public has become better educated and better informed on frozen foods. New and improved methods of handling and displaying frozen foods have been developed. While all this has been happening, there has been no real opportunity to determine if the consumer will take to quick frozen meats. Extreme shortages of meat, OPA regulations and restrictions and lack of equipment and packaging materials have made it almost impossible to find the answer.

As far as we are concerned, there is no mystery about freezing or packaging meats. We have been carrying on, and are still carrying on, extensive experimental work on quick frozen meats. I believe we know how to freeze and package most meat products. We have ready and available quite a number of quick frozen meat items. Some are for sales testing. Others are for actual distribution at the opportune time. These packages are complete in every respect. They have labels, designs and product name. These products would, I am sure, convince you that we can do the job of freezing and packaging. But, that is not the big problem. To better appreciate the problem of prepackaged quick frozen meats, let us visualize how the packer and retailer would be affected if quick frozen meats were to become a reality.

How the Packer Is Affected

The following changes would take place if the packer were to prepackage and quick freeze meats:

1. Many of the functions of the retailer would be transferred to the packer. Cutting, trimming, packaging and weighing would be done at packing houses instead of the retail store.

2. The packer would need new and specialized equipment for quick freezing, prepackaging, storage and transportation.

3. Large numbers of specially trained workers would be required in packing plants.

4. The packer's cost of preparing products in prepackaged form would be increased greatly. On some items the added cost to the packer of preparing prepackaged quick frozen meat products might be as high as $0.09 to $0.10 per lb. even after giving credit for the utilization of fats, bones and trimmings at the meat packing plant.

Various Cuts and Grades

OPA listed 38 standard retail beef cuts. The number of separate cuts of veal was 33. There were 20 separate lamb cuts shown. With pork, the number of cuts runs into the hundreds if every item listed in OPA regulations were to be considered.

Normally, there are a great many more beef cuts than the standard cuts listed by OPA. New England may want their meat one way, the West another way and the South still another. In addition, there is more than one grade of meat. Multiply the number of cuts by the various grades and see the number of products that must be handled. A revolutionary change would take place in the packers' method of operating and manner of doing business if all these products were to be prepared in prepackaged quick frozen form.

How the Retailer Is Affected

A tremendous transformation would occur in the retailer's meat operations if he were to go completely into prepackaged quick frozen meats. Present equipment and facilities in the retail shop for handling fresh meats and the great number of operations performed by the butcher would be obsolete. Instead, the retailer would only require storage space and self-service display cases for prepackaged meats. The retailer would pay more to the packer for his meats, inasmuch as the packer takes over the butcher's functions.

(*Turn to Page* 240)

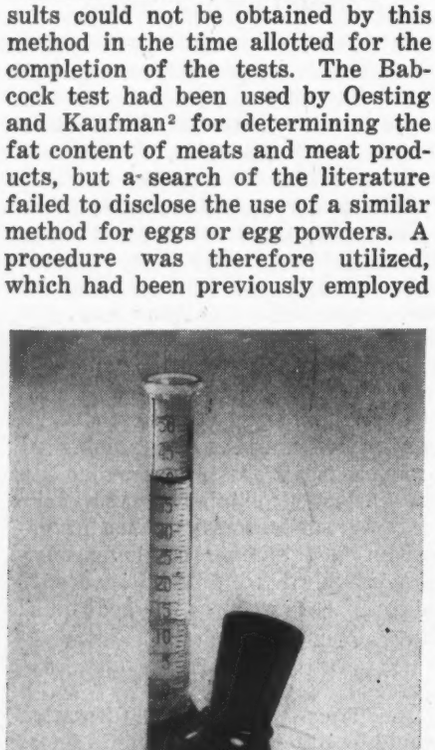
Rapid Method For Determining Fat Content of Dried Eggs

By a modification of the Babcock test, using the "Paley" bottle with special strength acids, the fat content of egg powders can be determined with reasonable accuracy, and in less time than is required by the A.O.A.C. method

By CHARLES PALEY and SIDNEY RUBIN
Certified Laboratories, Inc., New York, N. Y.

THIS laboratory was called upon recently to analyze a large number of samples of egg powders for fat content. Experience with the A.O.A.C.[1] method, indicated that results could not be obtained by this method in the time allotted for the completion of the tests. The Babcock test had been used by Oesting and Kaufman[2] for determining the fat content of meats and meat products, but a search of the literature failed to disclose the use of a similar method for eggs or egg powders. A procedure was therefore utilized, which had been previously employed in this laboratory for viscous substances, powders and other materials, which are difficult to introduce into the Babcock test bottle. It is a modified Babcock test, made with the Paley test bottle[3], and proved to be rapid and reasonably accurate when compared with the A.O.A.C. method.

The Paley test bottle, described by Masurovsky[4], is a modified Babcock bottle, in which the graduated neck is moved off center to provide an opening for the introduction of the sample. It is provided with a long rubber stopper to close the opening after the sample has been weighed into the bottle. Samples may be weighed on a regular cream test scale.



The Paley test bottle is a modification of the Babcock bottle. The graduated neck is moved off center to provide an opening for introduction of the sample. A long rubber stopper is provided to close the opening after the sample has been weighed into the bottle.

The HCl (4+1) used for digestion and hydrolysis of the proteins is the same as that used for this purpose in the A.O.A.C. method. The H_2SO_4 (3½+1) is the same as used in the Penn State test for ice cream.

Method of Testing

1. Weigh 3 g. of the well-mixed sample into a 9 g., 20 percent Paley test bottle, using a cream test scale.
2. Add 20 cc. HCl (4+1), insert rubber stopper and mix well.
3. Place the bottle in a water bath at 70 deg. C, and gradually heat the water to the boiling point.
4. Shake at frequent intervals, using care to prevent foaming that may occur during the early stages

TABLE I—Comparison of Fat Assays in Dried Eggs

Sample No.	A. O. A. C. (% fat)		Modified Babcock (% fat)		Difference
1		41.84		41.4	—0.44
2		41.00		40.8	—0.20
3		40.93		40.8	—0.13
4		44.94		45.0	+0.06
5		44.76		44.4	—0.36
6		41.95		42.6	+0.65
7	41.15 42.26	41.70 av.	42.0 42.6 42.6	42.4 av.	+0.70
8		42.25		42.0	—0.25
9	41.29 41.39	41.34 av.		42.0	+0.66
10		40.94		41.4	+0.46
11	39.93 39.52	39.73 av.	40.8 41.4	41.1 av.	+1.37
12	41.22 41.39	41.30 av.	42.0 42.6	42.3 av.	+1.00
13	40.25 40.64	40.45 av.	41.4 41.4	41.4 av.	+0.95
14		40.11		40.2	+0.09
15	40.81 40.97	40.89 av.		40.8	—0.09
16		41.26		41.4	+0.14
17		40.74	40.8 40.8 40.8	40.8 av.	+0.06
18		40.65		41.4	+0.75
19		39.89	40.2 40.8	40.5 av.	+0.61
20		40.96		41.4	+0.44
21		40.34		40.2	—0.14
22	40.38 41.38	40.88 av.	42.6 39.6	41.1 av.	+0.22
23		42.03		42.0	—0.03
24		42.65		42.0	—0.65
Average Deviation ..					±0.43

Note: Where duplicate tests by the same method were performed, all results are indicated. Single results indicate single tests; "av." means average of results of more than one test on same sample.

of heating. Continue to heat in the boiling water bath until digestion is completed. This is indicated when lumps are no longer visible, and a clear layer of fat is observed on the surface. The digestion time is normally about 30 minutes.

5. Remove from water bath, cool under running tap water, add 3 cc. normal butyl alcohol and shake.

6. Cautiously add 8 cc. Penn State ($3\frac{1}{2}+1$) sulphuric acid, shake and place the bottle in a water bath at 60 to 65 deg. C. Temper for 10 minutes with occasional shaking.

7. Place bottle in a heated centrifuge, as used for the Babcock test, with the stopper facing the center of the machine. Whirl for 5 minutes.

8. Add hot water to base of neck.

9. Centrifuge for 2 minutes.

10. Add hot water to bring the fat into the graduated neck.

11. Centrifuge for 1 minute and place in a tempering bath at 54 deg. C. for 5 minutes.

12. Add glymol (colored mineral oil) and read.

13. Multiply the reading by 3 to get percent fat.

Comparative Results

When tests were completed by the above method, 24 samples of the egg powders were selected at random from all the samples tested, and assayed for percent fat by the A.O.A.C. method. Some were rechecked by the above described method. Results of these comparative tests are given in Table I.

Interpretation of Results

The average deviation in results of individual samples, obtained by our method from those obtained by the A.O.A.C. method was ± 0.43 percent. In 9 samples the difference was 0.20 percent or less; in 3 samples 0.21 to 0.40 percent; in 3 samples 0.41 to 0.60 percent and in 9 samples the difference was over 0.60 percent. The lowest difference between the two methods was 0.03 percent, while the highest was 1.37 percent. The range of deviation of duplicate results by the A.O.A.C. method was from 0.10 to 1.11 percent, the average being 0.48 percent while the range by our method was 0.0 to 3.0 percent with an average of 0.66 percent.

Some of the powders were of a very low grade and showed hard dark granules, which could not be broken up properly by a mortar and pestle. This was especially true of sample No. 22 and may account for the unusual difference in results obtained. Since 3 g. of powder were used in our method, while 1 g. was used in the A.O.A.C. method it might be expected that the difference would be greater between duplicate samples by our method. If sample No. 22 were eliminated, the average deviation would be reduced to 0.33 percent by our method as compared to an average deviation of 0.39 by the A.O.A.C. method.

Discussion

The density of egg fat is slightly lower than butterfat for which the graduated portion on the Paley test bottle is calibrated. Leach and Winton[5] give the range of specific gravities for egg fat as 0.9121 to 0.9144 and for butterfat as 0.930 to 0.940 at 15 deg. C.

Since the method described is rapid, it has its value as a control method for most materials containing fats and oils. It has been used successfully, in this laboratory, on yolks (dried and sugared) and whole eggs (dried and fresh).

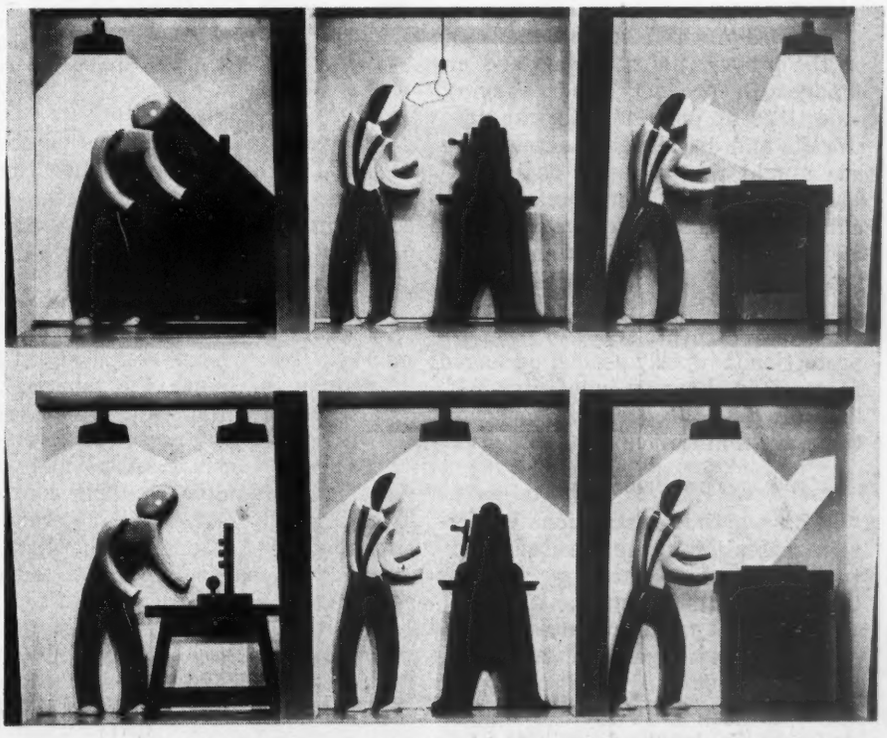
The accuracy of the bottle is one scale division or ± 0.2 percent. Variations in results, however, may be reduced to a minimum by the use of an accurate balance and by performing tests in duplicate. Any error, either in weighing or reading the fat column, will be multiplied in the final results. Any tests showing charred material or undigested matter in the fat column should be rejected and the test repeated. In weighing, any extraneous matter should be removed from the outside of the bottle opening before the weighing is completed.

In order to preserve the rubber stopper, the bottle should be emptied immediately after the test is finished and the stopper washed in cold water.

References

1. Official and Tentative Methods of Analysis, Fourth Ed. Association of Official Agricultural Chemists, Washington, D. C., 1935.
2. R. B. Oesting and J. P. Kaufman, Rapid Determination of Fat in Meat and Meat Products, *Industrial & Engineering Chemistry*, Anal Ed. 17 125, 1945.
3. Charles Paley, Method for Testing Butter for Percent of Fat, using Paley Test Bottles, *Journal of Milk Technology*, vol. 6, No. 5, 1943.
4. B. I Masurovsky, More Accurate Test for Butterfat. *Food Industries*, vol. 16, No. 10, 73, 1944.
5. Albert E. Leach and Andrew L. Winton, "Food Inspection and Analysis." Fourth edition, John Wiley and Sons, Inc., New York, 271, 1920.

Curing Lighting Defects



Right and wrong ways of placing lights are demonstrated in a Westinghouse educational exhibit that will shortly go on a nationwide tour. The upper series of models illustrates improper lighting, causing shadow, direct glare and reflected glare. In the lower series, lights have been corrected. Courtesy Technical Press Service, Westinghouse Electric Corp.

Future of Frozen Foods Depends on Proper Packaging

The food technologist must cooperate with the packaging industries to establish proper packaging specifications. Sales appeal, product protection, production requirements, labor and material costs are essential factors to be considered

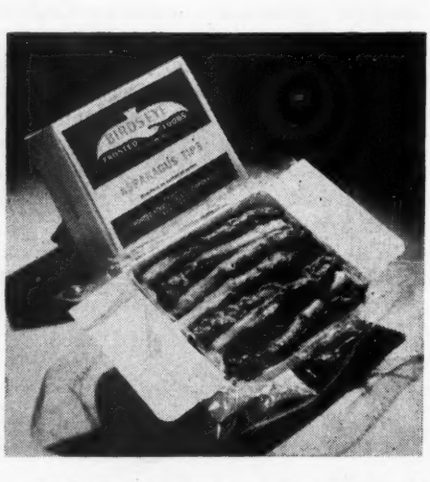
By ALBIN P. DEARING, Executive Director, The Packaging Institute, New York City

PERHAPS the best way to analyze the problem of proper selection of materials for frozen food packaging is to look back and see what changes and developments took place in this specialized packaging field. Briefly, in its earlier development during the Thirties, the production of quick frozen fish, fruits and vegetables progressed in an orderly, if accelerated, fashion. Those few companies responsible for this development had the problem well in hand. The peculiar technical aspects of frozen foods were cautiously explored, with sound pioneering supervision, to guarantee the quality and development of this new infant specialty into a full and healthy maturity.

Knowledge was being accumulated on the proper raw materials and on changes in product under varying conditions of processing, packaging, storage and distribution. Experience has taught the processor that packaging is not alone a matter of external decoration or a conveyance for merely marketing a given amount of product. He has learned that the prime objective of functional packaging is to provide superior product-protection. Properly sealed, packaged frozen foods have an indefinite shelf-life, provided proper storage conditions are maintained.

The Problem

With wartime restrictions on certain materials, these carefully nurtured, sound packaging methods were, in a large measure, abandoned. Frozen foods were presented to consumers in packages just as nearly like the accustomed goods as it was possible to make them. Production demands and supply difficulties, however, stepped up the use of substitute packaging materials. Quality control suffered. With the increased demand for frozen foods, processors entered the field with little or no knowledge of packaging or of other aspects of the frozen food business. Quality deterioration was then marked.



Frozen Birds Eye asparagus tips are packaged in cartons with transparent liners. By prepackaging and quick freezing in multiplate freezers, the elimination of air pockets, and close adherence of the wrapper to the product are assured.

Spoilage

During the present high-volume market, frozen foods are packaged in a manner to invite the danger of spoilage to such an extent that both public acceptance and sound development are in jeopardy. Abnormal volume demand and poor quality control are seemingly related. It requires no imagination to understand what is meant by food spoilage as a source of danger to public health. From a commercial angle, such damage would threaten the development of the entire frozen food industry. In the mind of the average consumer, frozen foods are staples not yet distinguished as brand items. If one packer's line, or even a part of it, goes bad, the industry as a whole will suffer.

Frozen foods, however large their volume, are still a generic identification. They are still a long way from achieving the complete buyers' confidence so aggressively sought and unstintingly awarded to the canners and packers of heat-sterilized foods.

Status of Present Packaging

Have we actually the facts on hand to believe that present packaging of frozen foods is inadequate? Has not wartime experience indicated that perhaps the "good" prewar package was extravagant and more than adequate? Have any frozen food packages "broken down" in this market? Has there been an epidemic or even indications of wholesale consumer disaffection? Figures compiled by food technologists would indicate exactly the opposite.

But here are the dangers. In the first place, this big volume, quick turnover market is one of almost no shelf-life for frozen foods, specifically, a matter of a few days against a normal prewar shelf-life of several weeks. We know that three months' storage for any frozen product is not considered dangerous. But this three months' period, as far as frozen foods are concerned, must be measured from the time of harvesting to the time of consumption and must not be confused with shelf-life in the store.

Secondly, we are handling a highly perishable product. Should we continue to carry on with acknowledgedly improper packaging materials until we are forced to do a better quality control job? Or, should we recognize now that the present frozen food package, for the most part, is inadequate and that this abnormal market will not last forever? Should we not recognize the fact that the return to a more normal market will come without warning?

Statistics show the phenomenal growth of the frozen food business. For the year 1944 (later figures are yet unavailable) production of frozen foods was:

Fruits	315,000,000 lb.
Vegetables	286,000,000 lb.
Poultry	90,000,000 lb.
Seafoods	90,000,000 lb.
Cooked foods	10,000,000 lb.

There was no estimate for meat since most of it went to the armed forces.

Above statistics show a frozen food volume of 790,000,000 lb. Estimates for 1945 give a further increase, or better than 800,000,000 lb. Yet this represents only 1 percent of the total fresh fruit and vegetable consumption. The potential is anyone's guess. To the manufacturers of cartons, cans or glass containers a billion-unit market offers challenge enough without further embellishment.

Package Requirements

Why do we say, categorically, that the present packaging of most frozen foods is inadequate? What is actually needed to package frozen foods? What is the ideal? Here are the answers:

1. The package must afford complete protection, (a) against dehydration of product, (b) against bacteria within the container and (c) against discoloration and weakening of the carton caused by "leakage" from the product.

2. The package must meet the peculiar demands of frozen food packaging including: filling, assembly, loading, storage and distribution under conditions of controlled temperature.

3. Cost of package materials, of high speed application and of expensive cold storage must be considered in the functional design of the container.

4. The container must possess sales appeal as a distinct "point of sale" item.

From a standpoint of protection, an ideal container must have a zero moisture-vapor transmission rate. Why is moisture-vapor transfer important? Essentially, it is important because the system of freezing and storage is about 100 percent out of equilibrium. Inside the package we find a commodity of high humidity while outside the humidity is low. Moist products, when exposed to low humidities, lose moisture until they arrive at a point of equilibrium when no further losses take place. With loss of moisture from a product, dehydration results.

An ideal container must protect the frozen product from the possibility of bacteria present in the container itself. Investigations have shown that some paper stock is a fairly habitable place for bacteria, even at 0 deg. F. Actual contact between the board stock and the contents must be avoided. Such protection may readily be accomplished by applying coatings or laminates to the container, wrapping the product with suitable films or foils, inclosing in a separate bag, or using a container other than paper.

Packaged, frozen, precooked foods, containing a high percentage of fats and oils, require greaseproof materials. Fats pass through inadequate films or carton materials and not only ruin the appearance of the package but also invite spoilage.

After the product has been properly sealed it must remain so during low temperature storage. For example, some coatings will insure a hermetic seal when applied at 75 deg. F., yet at —20 deg. F. these same coatings crack with resultant loss of moisture-proofness. This same comment may apply to adhesives or film wraps. These difficulties can be avoided with the use of (1) special cold flowed, nontoxic and noncrystallizing adhesives made by progressive adhesive manufacturers and (2) moisture-proof cellophane whereon the moisture-proof coating is firmly anchored.

The frozen food package must have those properties that enable it to make and maintain a seal. It must be remembered that a seal is about 0.001 in. thick, regardless of it being an added compound, part of the wrap, or the coating. Such thin seals are likely to provide poor sealing. Seals which are inadequate at room temperature are worse at low temperatures.

Weight is important in all Birds Eye frozen fruits and vegetables. Here uniform weight of spinach packages is carefully maintained.

Recently, two dozen cartons selected from the leading frozen food outlet in New York were examined. Fully half of them had no seal. Although the wrap or flaps were stuck together, a completely hermetic seal, essential for a frozen product, was absent.

Ideal Container

In many respects an ideal container for frozen food packaging would be a vacuum-packed tin can or glass jar. The moisture-vapor transmission rate of either of these containers is zero. The can with no light transmission might have a slight advantage over the glass jar.

Certain factors mitigate against the use of either of these containers. The housewife, through force of habit, would stack frozen foods, so packaged, on the same shelves she has always used for heat-sterilized cans and glass jars. Being a creature of habit, she will overlook directions on the label that advise storing the can or jar in a frozen food locker or cabinet. Too, with glass there is always the danger of breakage, which makes it less desirable. Round containers mean loss of refrigeration storage space. Since locker storage is measured in feet, not in hundreds of feet, that loss is realistic in terms of dollars and cents. The actual space loss between round and square containers amounts to about 30 percent. Both tin and glass are costly when compared with other containers. For example, the No. 2 can is quoted at $25.00 per thousand; the paper carton at $10.00 or $12.00 per thousand.

Paper or Flexible Materials

Paper or other flexible materials are generally cheaper at the source, cheaper to ship, cheaper to store, and cheaper to assemble. Superior machines are taking these flexible materials out of the hand operating methods and putting them profitably on a high speed, volume production basis. Round paper-board containers can be filled easily without leakage. Furthermore, they nest easily and close simply. As to sales appeal, paper and other flexible materials allow all kinds of possibilities that are desirable from either a merchandising or advertising viewpoint. One may

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How Scale Prevention Cuts Bottle Washing Cost

PART II—Scale-free equipment, control over the strength and temperature of the washing solution, an efficient pre-rinse and a final chlorine rinse are essential to the delivery of clean, sterile bottles at the lowest cost

By PERRY E. PIPER, Pep Laboratories, Cleveland, Ohio

When selecting a compound to be used in a bottle-washing machine, first consideration should be given to its ability to wash and sterilize bottles. Since the ability to do this is governed by the caustic content of the compound, knowledge of the active caustic in the product being considered is essential. The total alkalinity is of little importance. If a declaration of the caustic content is not available, it can easily be determined by dissolving a weighed amount of the material in water and titrating the solution against an acid of known strength. Accuracy of control through the use of pH determination is the answer to many bottle-washing problems. Exact knowledge of the strength of the solutions needed and in use is necessary for efficient operation. With the newer apparatus being developed, the task should not be too difficult.

Caustic Requirement

The amount of caustic needed to produce clean sterile bottles will vary greatly with different plants. Hardness and type of water, condition of washer and effectiveness of its operation must be taken into consideration. Perhaps the most important factor is the kind of refuse left in the bottles. This may vary from remnants of the bottled product itself to its combination with oils, grease, paint and other foreign matter. In some cities the soot and grime from industrial plants add greatly to the problem of bottle washing. The correct cleaning compound will properly clean and sterilize the bottles at the lowest cost for the caustic value received. This may or may not be the cheapest product per pound.

The amount of free caustic in the solution is also an indication of its germicidal power. Extensive investigations have proven that a 5-min. soak in a solution containing 1.6 percent free caustic at 160 deg. F. will destroy yeast, mold and the bacteria commonly found in milk bottles. Most solutions are more effective with an increase in temperature. In fact, a temperature of 180 deg. F. can be used, provided the bottles are tempered with pre-rinse water to within 70 deg. F. of the temperature of the solution. In some washers provisions have been made for prewarming the bottles by exposing them to the hot vapor from the soaker tank before they are plunged into the hot caustic solution.

A high strength caustic solution in the soak tank is not necessary, and should be avoided, as it will etch the bottles and remove the pyroglaze lettering. A solution containing 2.0 percent free caustic is satisfactory.

Testing the Solution

The most common method of testing the solution for caustic content is to take a sample from the soak tank at a point farthest from the end where the recharge is added. Measure out 10 cc. of the sample into a titration cup. Add three to five drops of phenolphthalein (1 percent solution) and titrate with N/2 sulphuric acid until the red color disappears. A few more drops of phenolphthalein should be added to make sure the disappearance of the red color is the result of neutralization of the free alkali and not a decomposition of the indicator. Record this reading as *A*. Then add a few drops of methyl orange indicator (0.1 percent solution), and titrate with the same acid solution until a brownish red color appears. Record this reading as *B*. *B* minus *A* is the alkalinity resulting from salts other than NaOH in the solution. Deduct this figure from *A*, then multiply by 0.2, for the amount of free caustic present in the solution. For example:

If $A = 12$ and $B = 14$

Then $B - A = 2$. $A - 2 = 10$.

$10.0 \times 0.2 = 2.0$ percent free caustic as NaOH

Figuring the Charge

To calculate the amount of alkali needed to charge the washer, it is necessary to know the capacity of the soak tank and the caustic content of the alkali being used. Let us assume that the capacity of the tank is 600 gal., that the free caustic content desired is 2 percent and that the caustic in the commercial alkali is 70 percent. Then,

Table 1—Materials Used in Operation of Milk Bottle Washer.

Date	Alkali Lb.	Alkali Brand	Treatment Lb.	Treatment Brand	Total cost	Cost per 1,000 bottles washed cents
Dec., 1939	1870	A	118	X	98.17	32.0
Feb., 1940	2229	A	152	X	130.00	43.0
Mar., 1940	718	B	262	Y	51.50	17.0
July, 1940*	745	B	342	Y	64.30	21.0
Sept., 1940	545	B	333	Y	53.80	17.6
Nov., 1940	377	A	24	X	24.16	6.9
Dec., 1940*	411	A	41	X	25.31	7.6
Feb., 1941	422	A	48	X	18.91	6.5
Mar., 1941*	415	A	40	X	24.41	7.5
July, 1941*	360	A	30	X	20.01	5.3
Sept., 1941*	442	A	41	Z	24.94	8.3
Nov., 1941*	323	C	35	Z	21.58	8.6
Dec., 1941	223	C	46	Z	16.14	6.5
Feb., 1942	191	C	54	Z	13.52	4.89
Mar., 1942*	365	A	30	X	19.53	7.0

*Represents recharge dates when approximately 130 lb. of alkali and 13 lb. of water treatment compound were added to the soaker tank.

$600 \times 8.4 = 5040$ lb. of water in the soak tank

$5040 \times .02 = 100.8$ lb. free caustic required

$100.8 \times 100/70 = 144$ lb. commercial alkali needed.

The upkeep charge of a washer solution after it is in use may be calculated in several ways. Investigations have shown that approximately 1 lb. of caustic is lost for each 1,000 milk bottles washed. If 25,000 bottles are washed, 25 lb. of caustic must be added to replenish the solution. An accurate way to compensate for this caustic loss is to test the solution as previously outlined, check the volume of water in the tank, make the necessary calculations and add the amount of caustic required. This calculation is made exactly as for the initial charge. The test may show only 1.6 percent caustic, for example. Since 2.0 percent is desired and counted necessary, 0.4 percent x 5040 (weight of water in soaker) is the quantity of caustic required. This figure multiplied by 100, then divided by the percent of caustic in the commercial alkali being used is the amount of alkali to be added. Since the caustic content varies with the different commercial brands, the analysis of the particular compound being used must be known.

In the past few years, an electronic device has been employed for the testing of alkaline solutions with very satisfactory results. This instrument is set for a particular composition of alkali so that a direct reading of the percentage of caustic can be made by adjusting the instrument for the temperature. With further development and application, this conductivity meter may supplement or replace the laboratory testing of washer solutions, particularly in smaller plants.

Method of Adding Alkali

The procedure by which the alkali is added to the washer is important. Merely dumping it into the soaker tank is not enough. When the dumping method is used, some of the alkali will dissolve to form a stratum of supersaturated solution around the undissolved particles. Since this solution is heavier than the water, it keeps the water away from the undissolved portion and several hours or days may elapse before all of the alkali is dissolved. A better method is to dissolve the alkali in warm water, using a wooden bucket or other container that is not affected by the caustic, and then pour the solution into the front of the soak tank. As the machine operates, the solution is carried to the rear of the tank and is mixed more completely and more rapidly than if it is added by any other means.

The Pre-Rinse

The pre-rinse operation is very important from the standpoint of retaining the strength of the soaker solution. Foreign matter carried over into the soak tank is the primary cause of poorly washed bottles in many plants. Bottles that are properly rinsed with warm water at sufficient pressure to loosen the dirt will be much more likely to emerge from the machine in a clean sterile condition than bottles that have not been properly rinsed.

In most milk plants the final rinse is followed by a chlorine water rinse to insure sterile bottles and to guard against re-contamination by rinse water that is not sterile. A chlorine content of 15 ppm. will do a satisfactory job although some health officials require 50 ppm. As residual chlorine may destroy color, care must be taken not to over-treat bottles that are to be used for colored beverages. Two sets of chlorinating jets should be installed as a precaution against clogged jets.

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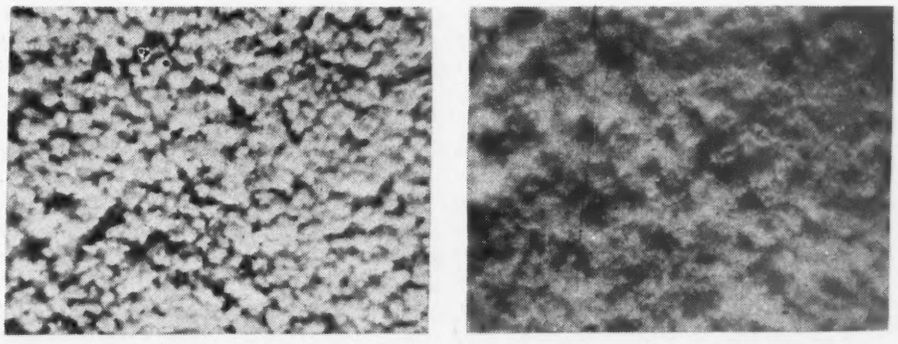
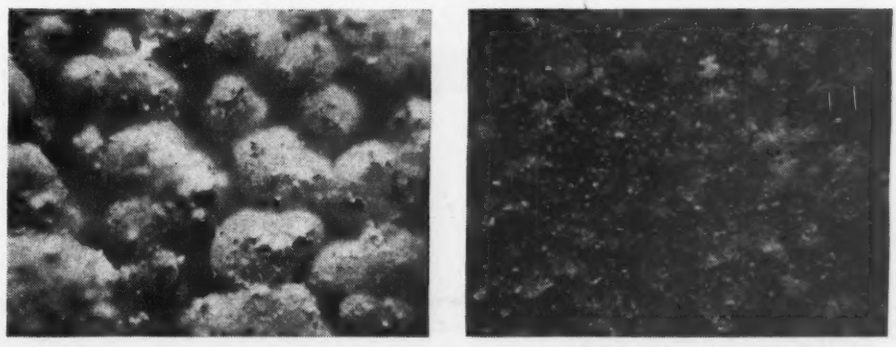
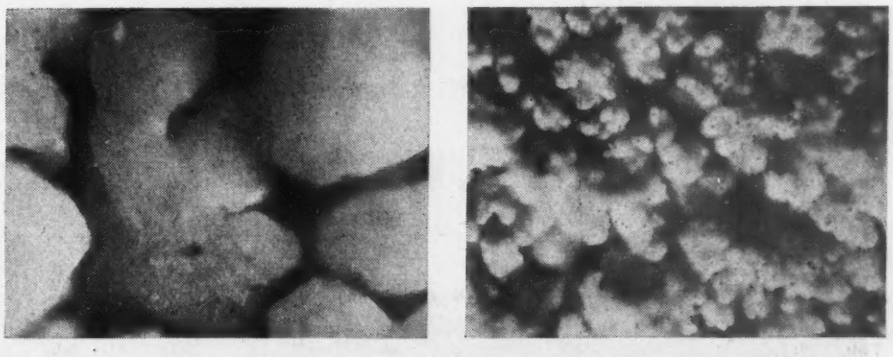


Scale from different parts of bottle washer, caused by the use of 18-grain hardness water. (Left) White scale deposited in rinse tank. (Right) Brown scale deposited on chains.



Scale from different parts of bottle washer, caused by the use of 50-grain hardness water. (Left) Cream scale deposited on rinse tank. (Right) Scale deposited on black test strip.



Scale from different parts of rinse tank on the same machine vary widely in appearance. (Left) Yellow scale, and (right) grey white scale deposited in 50-grain water.
Scale formations are largely mixtures of insoluble calcium and magnesium carbonates, phosphates and silicates. They differ in appearance, in physical and chemical composition and frequently in color, depending upon the degree of hardness, the dominating mineral content of the water, and where the scale is formed in the washer. Photomicrographs of six types of scale are shown. Courtesy of Wyandotte Chemicals Corporation.

New Research Laboratory Will Aid the Food Processor

Here is a fully equipped laboratory that is finding solutions for many food processing problems. Whether the need is for redesign of equipment or change in manufacturing procedure, this organization is prepared to find an answer

EXTENSIVE facilities for applied research in food processing are provided in the new laboratories recently opened in San Jose, Calif., by the Food Machinery Corp. Designated as the Central Research Department, the new unit is a further extension of a program that has already resulted in many discoveries and improvements in food processing and food handling. Under the direction of Paul C. Wilbur, director of research, who will be responsible for the broad program of investigation, the department will undertake the development of processes and machines that will increase the efficiency of the food processing industry and ultimately lower production costs. A budget exceeding $1,000,000 for operations during the first year is an indication of the project's proportions.

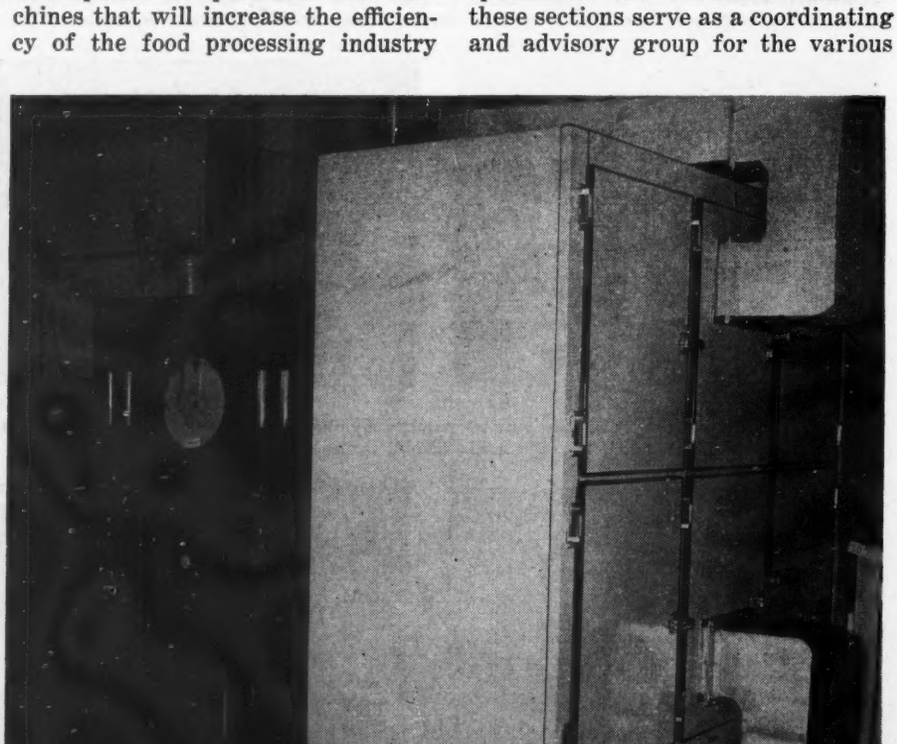
Five Units

Central Research has five major sections: Canning, raw products, evaporated milk, food freezing and sprays. Each section has its own staff of chemists, physicists and bacteriologists, all experienced in the particular branch of food processing in which their respective sections specialize. The combined staffs of these sections serve as a coordinating and advisory group for the various divisions of the parent corporation and for each division's research department. Many machines and processes have resulted from this program.

One of the most complete and modern technical units of its kind, the department is equipped with several laboratories and a large test room. Installations include basic scientific equipment and semi-commercial machines necessary to carry through the greatly enlarged program.

The chemistry laboratory is equipped to work on a variety of problems connected with the handling of food products, including nutritional and other quality values of food after it has been subjected to handling, preserving and treating processes.

A completely equipped bacteriological and phytopathological laboratory is conducting continuous research, aimed at extending the storage and market life of food products. Two of FMC's commercial developments along these lines are the Hypo-Clor and Flavorseal processes. The former subjects food raw materials to a disinfecting bath, which destroys or arrests the growth of microorganisms. Cleaned and sterilized products stay fresh longer, with a resultant decrease in spoilage during handling and processing.



This controlled environment cabinet is used by microbiologists to determine the rate of growth of molds and other fungi in relation to light, humidity and temperature.

Prevents Shrinkage

Flavorseal provides an extra "invisible outer skin," which seals in natural qualities and keeps treated products fresher than when the fruits and vegetables are not protected. Tests show that this protective film (15/100,000 of an inch thick) prevents up to 60 percent shrinkage (loss of moisture) in lemons, up to 40 percent in oranges and tomatoes, and gives similar protection to tangerines, grapefruit, cantaloupes, cucumbers and peppers.

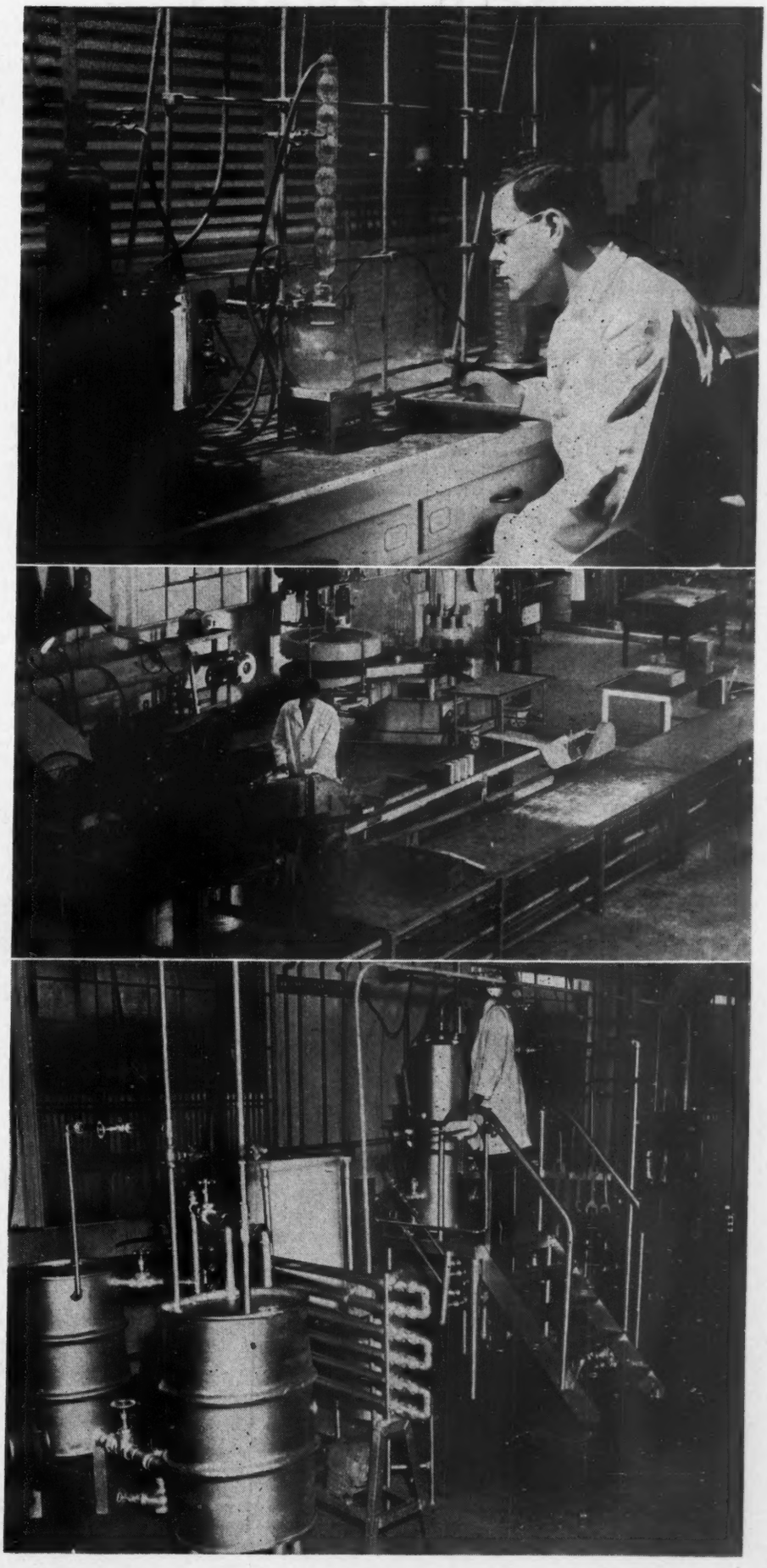
The spray laboratory is a highly specialized section of Central Re-

search. It was established to accurately study the character and behavior of high pressure sprays. One feature is a "spray tunnel," having some similarity to the wind tunnels of aerodynamics laboratories. A practical application of this spray testing equipment is the study of the effects of the FMC Fog Fire Fighter. This was developed during the war for use on "crash trucks" at military airfields to quench fires resulting from aircraft crashes. The Fog Fire Fighter atomizes water under 600-lb. nozzle pressure, multiplying its efficiency many times. Stubborn gas and oil fires can be extinguished in a very short time and with a minimum amount of water.

New processes or equipment may be tried out on a semi-commercial scale in the test room. This section contains a pilot cannery and a pilot evaporated milk plant. Conditions of commercial plants can be duplicated on an experimental scale.

Effect of Storage

Since many products must be stored under controlled conditions to bring out the effects of new handling procedures, several storerooms have been built in which conditions can be widely varied, but accurately controlled. This testing section has two hot rooms for storing food products, or bacteriological cultures, at temperatures controlled within 1 deg. F. over a range of 85 to 125 deg. F. A freezer storage room maintains temperatures as low as –30 deg. F. Three other rooms, provided with both temperature and humidity controls, have been equipped for work with raw products. Temperatures in the two largest rooms can be maintained at from 32 to 90 deg. F., with relative humidities ranging from 10 to 90 percent.



The facilities of the Central Research Department are apparent in the three typical views at the right. The chemistry laboratory, shown at the top, is equipped for work on a variety of food problems, including organic analysis of food products after various kinds of treatment. The middle picture shows a corner of the large test room, where new processes or equipment can be tried out on a semi-commercial scale. This section contains pilot cannery machines and an evaporated milk pilot plant, the latter shown in the bottom picture. The test room is equipped to duplicate conditions that are encountered in the commercial plant. This section also has two hot storage rooms, a freezer storage room, and three other rooms equipped with temperature and humidity controls, in which investigations on raw materials are conducted.

TOP ICING
For Perishable Loads

These crushed ice packing machines provide a quick and economical method for safely transporting such fresh foods as vegetables, fish and milk by truck

TOP ICING of truckloads of vegetables, fish, milk and other foods with snow ice provides a quick and economical means of protecting such foods in transit. When shipping produce from grower to market, this protection assures salable condition on arrival and usually top prices.

The snow ice is obtained through a patented process by means of a Link-Belt ice crusher-slinger. The device reduces cake ice to small particles and then blows them through a flexible hose in a controlled stream of high velocity over and between all parts of the load. If fine ice is available from other sources, the slinger or blower part of the machine alone is sufficient.

Several Models

The basic Link-Belt machine is made in several models of different capacities. They are driven either by a gasoline engine or an electric motor. Some of the models are of the stationary type while others are portable. With this choice, the truck or trailer may be driven to the machine or the machine moved to the vehicle, depending upon conditions surrounding the operations.

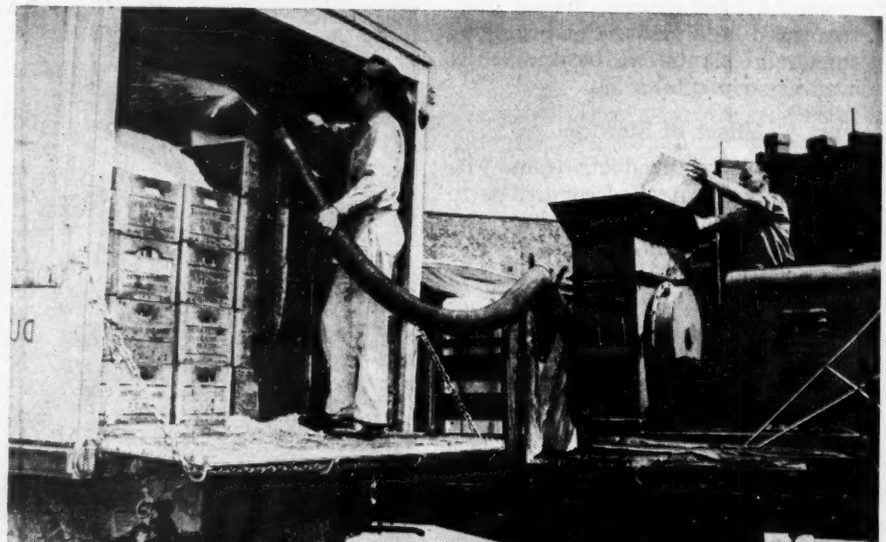
Several models of the machine are designed especially for top icing railroad refrigerator cars. Some of the truck models are used by private fleet owners to refrigerate their own foods in transit. Others are set up at regular icing stations, at which either private or common carriers may have their loads top-iced at will.

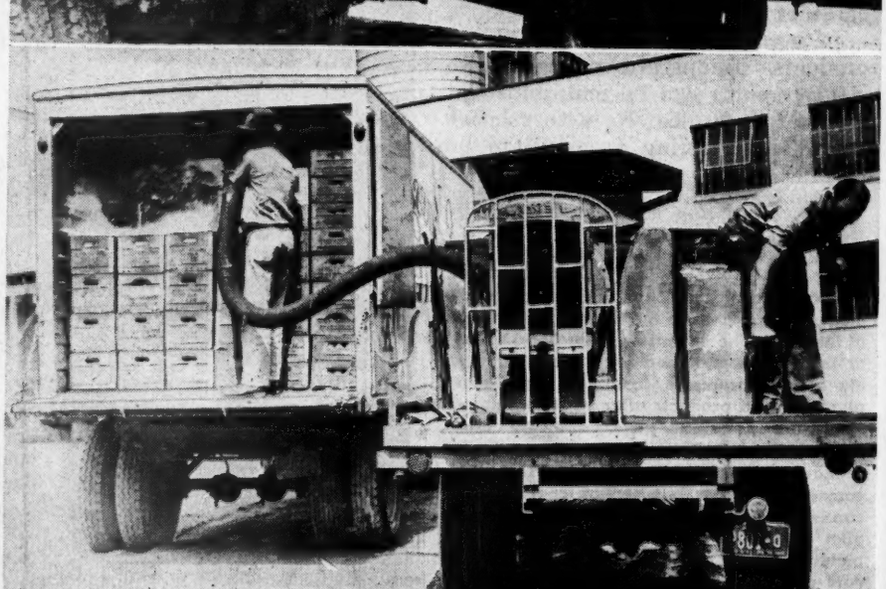
While the relative merits of mechanical refrigeration and top icing are beyond the scope of this article, top icing of truckloads of perishables, when other forms of refrigeration are not available, does provide a quick and dependable means of protection. Many commission men and produce buyers recommend top icing for a wide variety of fresh vegetables, especially those of the leafy type. These include lettuce, cabbage, spinach, celery, endive, broccoli and parsley. Other vegetables similarly protected include green corn, peas, onions, artichokes, Brussel sprouts, beets, carrots and radishes.

Top icing has also been effectively used to protect various types of fish and sea foods, such as herring, shrimp and oysters.

The top-icing method has been widely used for bottled milk, transported in cases between pasteurizing plants and local and suburban branches, from which it is delivered later by route trucks.

In the crusher-slinger operation, the jet of the high-velocity snow ice is directed into the top of all parts of the vehicle body, until a thick bed completely covers the tiers of crates, hampers or bags. Just before the rear doors are closed, the jet is directed at the rear containers so that they are encased in a thick snow-ice protective blanket. These blankets provide adequate refrigeration for keeping the produce in good condition. With leafy vegetables, the contact with the melting ice prevents wilting or spoilage.





These two views show how the Embassy Dairy Co. uses the Link-Belt ice crusher-slinger to fill cases of bottled milk with snow ice prior to transfer to branches, where they are picked up by route trucks for delivery to consumers. This machine is mounted on a small truck.

The snow-ice machines illustrated on these two pages are manufactured by the Link-Belt Co. The machines are made in four different types known as Series 100, 200, 300 and 400. The 400 model is intended for large-volume railroad car icing and the first three are adaptable for truck icing.

The 100 Series has a capacity of 1 ton in 8 minutes; Series 200, 1 ton in 3 to 4 minutes and Series 300, 40 to 60 tons per hour, according to the kind of power unit employed and the method of input. All models come in stationary or portable types with bases to which either a gasoline engine or an electric motor may be applied. Both stationary and portable models are shown in the accompanying illustrations.

Icing Stations

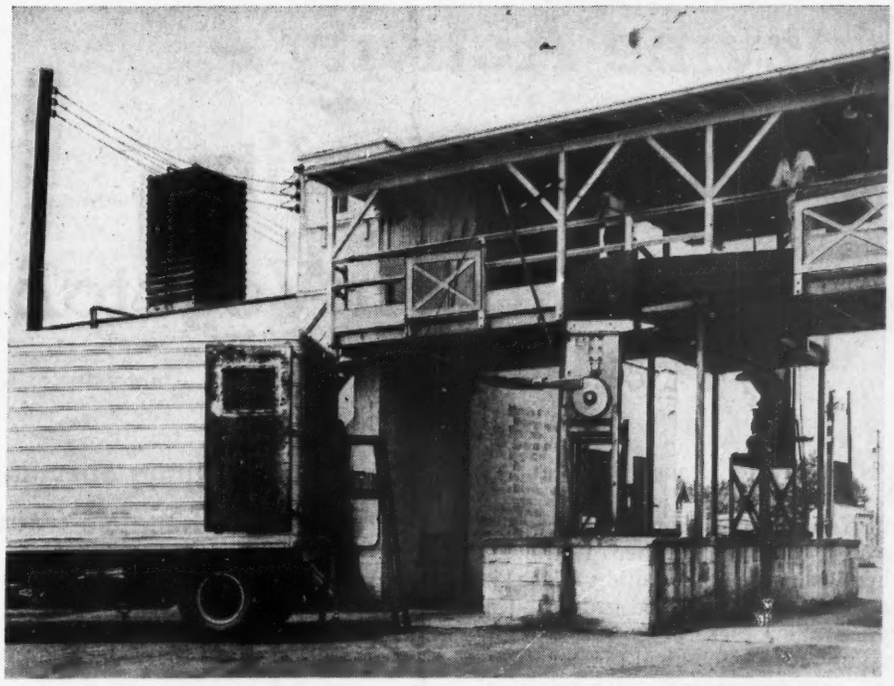
The public icing station of the Diamond Ice & Coal Co., near New Castle, Del., on the main highway from the south along the Atlantic seaboard to New York, is equipped with two stationary models. One of these crushes 300-lb. cakes of ice and the other, 50-lb. cakes. This station also provides cake ice for trailers with end bunkers and inside fans to circulate the cold air for loads of strawberries and peaches, moving north from the Carolinas and Georgia.

Another illustration shows a portable type for small 50-lb. cakes of ice as used in a packing shed in the Salinas valley of California. The view shows an electric motor-driven model being used to top-ice a trailerload of freshly crated lettuce.

Easily Operated

The illustrations of the ice crusher-slinger used by the Embassy Dairy, Washington, D.C., picture a stationary gasoline engine unit made portable by mounting on a regular road truck. It brings both the cakes of ice and the machine itself to the tailgate of the trailerload of bottled milk in cases. Two men are required in the top icing operation, one to feed ice into the hopper of the crusher and the other to direct the flexible hose in distributing the snow ice.

The standard discharge hose furnished with the machine is 10 or 12 ft. long and made of several plies of rubberized duck, reinforced by internal spiral steel wire with smooth, abrasion-resistant rubber lining. Swiveling deflector nozzles for use on the discharge ends of the hose are supplied as extras.

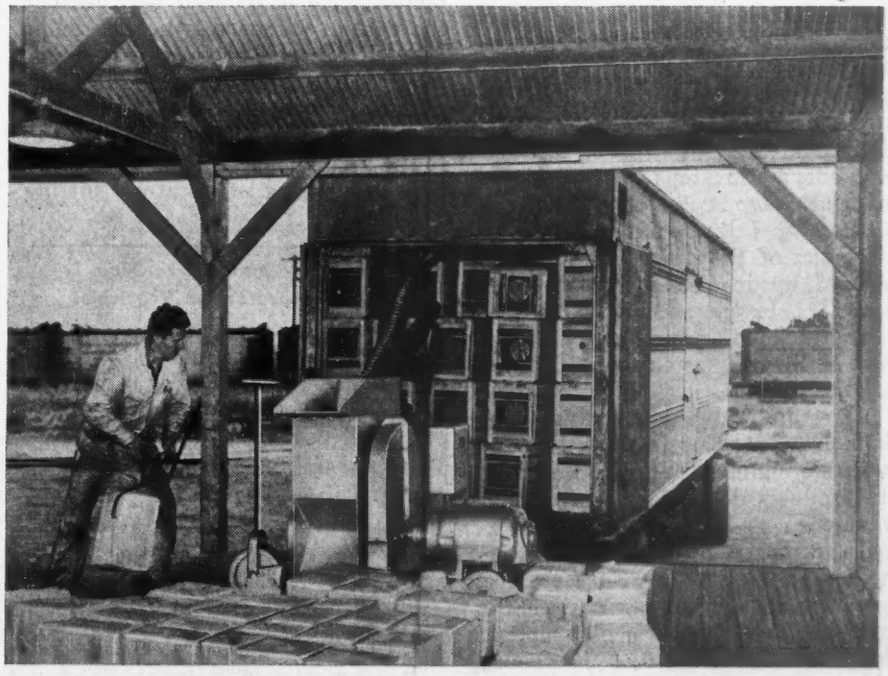


The public icing station at New Castle, Del., performs the fourth top icing operation on this load of lettuce since the truck left Orlando, Fla., bound for the New York wholesale market.

In actual operation, the top icing of the truck load is accomplished by the driver. He removes the back end of the top layer of cases and blows the snow in solid in the front end. Next, the cases that were removed are replaced and the balance of the top row is iced in solidly. The ice is also blown between the cases to the floor of the truck.

The final operation is to seal in all the cases facing the rear door with a blanket of snow ice. With the rear doors closed, the load is thus encased and ready to be dispatched.

That this method of refrigerated transportation is reliable is attested to by the condition of the produce upon its arrival at destination. It is also marked as an economical practice for the many fresh fruit and vegetable producers who prefer natural ice to mechanical refrigeration for perishable loads.



Here is a portable, electric motor-driven model of the Link-Belt top-icing machine being used to protect lettuce as it is loaded at a packing station in the Salinas Valley of California.

Enzyme Activity — Index of Quality In Frozen Vegetables*

By M. A. JOSLYN, Division of Food Technology, University of California, Berkeley, Calif.

Without inactivating enzymes the best frozen vegetables go "off flavor" because freezing slows but does not stop enzymes. Problem: When are they under full control? Should we test for oxidase or peroxidase survival? How?

IN all living tissues, both animal and vegetable, the enzymes present function as promoters or catalysts of the large number of different chemical processes taking place in cellular metabolism and growth. Enzymes allow these processes to occur rapidly at physiological temperatures and concentrations. These vital chemical processes are regulated in rate and order and are coupled with each other, either directly, or through the intermediate products of metabolic breakdown. Thus, the overall reaction in a given cell proceeds by well-defined steps with enzyme or enzyme systems functioning at each step as a "bucket brigade" to facilitate transfer from one stage to the next.

To illustrate the complexity of these processes: In the respiration of glucose in the presence of oxygen, by a direct oxidation process in which glucose is eventually converted to carbon dioxide and water, this sugar is broken down in regulated stages in a series of coupled individual enzymatic reactions, Hogness,[1] Goddard.[2] In the first phase (formation of pyruvate from glucose), 12 separate enzymatic steps and one non-enzymatic step are involved. In each of them an intermediate, formed as a product of the preceding reaction, is used up in the succeeding one, Barron.[3] In the second phase—not so well defined—from three to more than 12 enzyme systems are involved, Krebs.[4]

These individual enzymatic reactions are controlled in the intact cell in such a manner that the intermediate products do not accumulate, but when the cells are damaged by freezing or mechanical injury these intermediates may appear. Furthermore, enzymes like catalase, peroxidase, and phenolase (the role of which in the overall reaction is not clear) may become activated and produce abnormal changes. In senescence, or upon injury, the naturally occurring enzymes may produce profound decomposition resulting in solution of cell contents and even of cell walls. This type of decomposition is known as autolysis.

Freezing Only Slows Enzymes

It has long been recognized that low temperatures and ice formation do not inhibit although they do retard enzyme activity. The rate of enzyme action is decreased as the temperature is reduced but, because the rate of decrease is not the same for all enzyme-substrate systems, refrigeration may bring about an imbalance in the chain of stepwise enzyme reactions. This would lead to the accumulation of intermediates. The sweetening of potatoes, pitting of grapefruit, and purpling of cauliflower are examples of the well recognized low-temperature injury in plants. Enzymes also differ in their power to survive prolonged exposure to freezing temperatures, and changes in the enzyme systems by partial destruction of the more labile enzymes, such as the dehydrogenases, may alter the type as well as the rate of chemical change produced.

The early literature on the influence of low temperatures was summarized by Hepburn[5]. He reported that a number of enzymes survived prolonged exposure to temperatures varying from about 0 deg. C. to as low as —191 deg. C. (—312 deg. F.), (liquid air), either in the tissues or in solution. Sizer[6], in his recent review of the effects of temperature on enzyme kinetics, again called attention to the fact that enzymes are not inactivated by storage at temperatures as low as —186 deg. C. (—303 deg. F.). Although freezing does not inhibit enzyme activity, and even though enzyme action continues to occur in the frozen state, ice formation has a marked retarding effect. Lineweaver[7], and Sizer and Josephson[8], recently called attention to the fact that, for the few cases investigated, the velocity of enzyme reaction is faster in the supercooled state than in the frozen state at the same temperature. The velocity greatly decreases when the change of state occurs. This decrease must be due to increase in concentration of substrate and to other changes which take place in the physical and colloidal properties of a system when it passes from liquid to solid state.

That changes occur in the flavor of most vegetables during freezing storage is now common experience.[9, 10, 11, 12, 13, 14] These changes in flavor have been ascribed to the activity of natur-

TABLE I—Characteristic Odors Of Unblanched Frozen Vegetables

(After storage for two to four years at 0 deg. F.)

Asparagus	Sharp silage odor reminiscent of overheated grass in stacks; the butts have a milder off-odor than tips or stalks
Beans, green	Sweet alfalfa odor
Beans, lima	Odor of oil of bitter almonds; slightly putrid
Brussels spouts	Stale cabbage odor
Artichoke hearts	Sharp silage odor with fishy background
Spinach	Sharp alfalfa odor; tobacco or herring brine
Peas	Fruity alfalfa odor
Beans, horse	Pungent sweet butyric odor
Squash	Sharp acetaldehyde-like odor; burnt or rotten pumpkin

*Based on an address before Frozen Food Technology Conference, April 19-20, 1946.

ally occurring enzymes not inhibited by low temperature or ice formation. Thus, Morris and Barker[13] reported that freezing and storage at temperatures as low as —313.6 deg. F. did not have a permanent inhibiting effect on the autolytic enzymes of peas. The undesirable off-flavors produced on freezing storage of raw or underblanched vegetables were found by us to be due to the accumulation of unknown rather volatile compounds. Although the off-flavors formed in all vegetables are sufficiently similar to be loosely termed "hay-like," they differ with each vegetable, ranging from the distinctly alfalfa like odors developed in green beans to the sharp acrid odor in squash (Table I).

The limited study that has been made of the effect of storage temperature on rate of production of off-flavors indicates that this rate decreases with decrease in temperature. At 0 deg. F., according to Tressler[15], enzyme action is still sufficiently rapid to change the flavor of unblanched vegetables in a few weeks. "If, however, the temperature is lowered to —50 deg. F., the rate of enzyme action is so greatly reduced that most unblanched vegetables may be kept for six months or longer without the development of off-flavors."—Tressler[15].

Since the usual cold storage temperatures are seldom much lower than —10 deg. F. it is essential that all the vegetables be treated to inactivate the enzymes concerned in off-flavor formation. Just what enzyme systems and substrates are involved is not known. Nevertheless, there is good evidence for belief that one or more of the respiratory enzymes are involved and that the off-flavors are similar to those produced in plant tissues undergoing anaerobic respiration [more correctly fermentation, Goddard[16]] as a result of sub-oxidation or cell injury, Kohman and Sanborn[17].

The belief that respiratory enzymes are involved in the formation of these "off-flavors" during freezing storage was strengthened by the finding of Arighi, Joslyn and Marsh[18] that acetaldehyde, a recognized product of the anaerobic respiration of plant tissue, was formed as a result of enzyme activity in the tissues of frozen peas. The acetaldehyde content of peas was found to be a good indication of quality, since the quantity present decreased with decrease in catalase activity. Also, it paralleled flavor loss, being least in peas which retained their flavor, and highest in off-flavored samples. In spinach, however, the acetaldehyde content could not be used as an index of flavor quality as it remained constant irrespective of treatment. Acetaldehyde accumulation was observed also in artichoke hearts by Joslyn, Bedford and Marsh[19]; green beans, Bedford and Joslyn[20]; asparagus, Joslyn and Bedford[21]; and in lima beans, brussels sprouts and squash by Joslyn and Bedford[22]. Some data were obtained on the variation of acetaldehyde content in commercial packs considered to be "satisfactorily blanched," but more are needed before acetaldehyde content can be evaluated as a criterion of adequacy of blanching or of flavor retention.

TABLE II—Thermal Death Rate of "Gum Guaiac-Peroxidase" in Vegetable Tissues and Vegetable Juices

Vegetable	*Minutes to inactivate peroxidase in juice*		*Minutes to inactivate peroxidase in tissue*		*Minutes to retain flavor*		*Heat penetration (minutes to reach 180° F.)*
	180° F.	*212° F.*	*180° F.*	*212° F.*	*180° F.*	*212° F.*	
Stringbeans	>6	3	>5	2	190°–4	2–3	
Lima beans (H. Bush)	3	1	2	1	10	5	
Peas	3(?)	1(?)	>3	>2	2	½–1	
Horse beans	2	1	>2	2	190°–2	2	
Summer Squash (large, cut in ¼'s med., cut in ½)	>6	1	—	>12	—	10	5–12 (1 to 1½ in. dia.)
Yellow Italian Squash (large, cut in ½)	>6	>5	—	>10	—	10	8–19 (1½–2 in. dia.)
Green Italian Squash (large, cut in ½)	>6	>5	—	>7<10	—	10	6–20 min. (1¼ in. dia. to 2¼ in.)
Cauliflower	>6	2(?)	>9	>3	—	3–4	
Bean Sprouts	>6	4	>10 (190°)	>4<5	—	5–6	3–4 min.
Artichokes	2	1	—	7 min. (½% citric)	—	7 min. (½% citric)	3–5 min.
Asparagus	2	1	4	2	—	2–3	
Spinach	>6	4(?)	6	3	—	3	

Blanching Inactivates Enzymes

To inactivate the enzymes concerned in flavor change, the practice of scalding in steam or hot water followed by subsequent cooking in water was introduced by the early investigators. This practice, which is now well established in the industry as an essential step in the preparation of vegetables for preservation by freezing, was introduced before there was any knowledge of the nature of the enzymes involved, the substrates acted upon, or the type of changes brought about in the product. [See the review of early investigations by Arighi, Joslyn and Marsh[18] and Joslyn and Marsh.[23]] In establishing the scalding period required, vegetables were heated for various periods of time at different temperatures, were stored for various periods of time at temperatures of —10 to 10 deg. F., and examined periodically. The degree of flavor retention in these vegetables was compared with the activity of enzymes that could be readily determined or that were suspected of being concerned in the formation of undesirable flavors. As a result of such tests an empirical correlation was observed between the activity of certain test enzymes used as indicators and flavor retention. The test enzymes used were catalase and peroxidase. In general, if the scalding treatment is not sufficient to inactivate catalase and peroxidase, the frozen vegetables will develop off-flavors; and conversely, commercially processed samples, off in flavor, will contain active catalase and peroxidase enzymes.

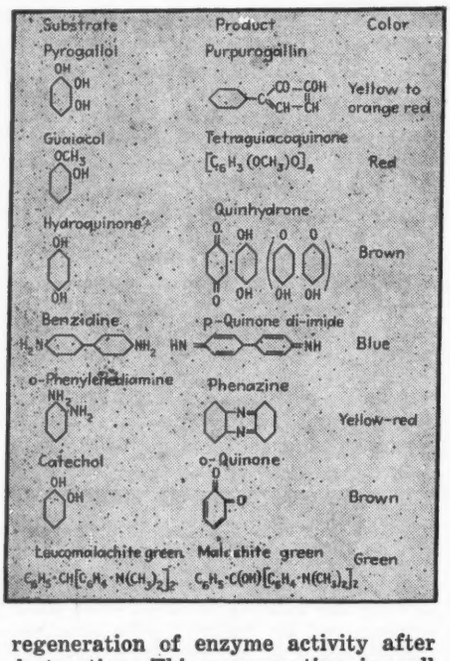
The problems involved in destruction of enzymic activity by heat have been summarized by Balls[24, 25] who stressed the difficulty of its complete destruction, also possibility that the products of decomposition by heat might exert slight catalytic action, and the possible

TABLE III—Peroxidase Reagents Introduced for Detection of Enzyme in Various Biological Materials

	First Introduced
Compounds with 1 free OH	
benzyl alcohol	Schmiedeberg (1881)
carvacrol	Bourquelot (1896)
o-, *m*-, *p*-cresol	Bourquelot (1896)
eugenol	Bourquelot (1896)
isoeugenol	Cousin and Herissey (1908)
guaiacol	Bourquelot (1896)
α-naphthol	Bourquelot (1896)
phenol	Bourquelot (1896)
salicylic aldehyde	Schmiedeberg (1881)
thymol	Bourquelot (1896)
tyrosine	Bourquelot (1896)
vanillin	Lerat (1903)
o-, *m*-, *p*-xylenols	Bourquelot (1896)
Compounds with 1 free NH_2	
amidol	Leffmann (1898)
aniline	Bourquelot (1896)
pyramidon	Kobert (1903)
o-, *m*-, *p*-toluidine	Bourquelot (1896)
xylidine	Bourquelot (1896)
Compounds with 2 or more OH	
aloin	Klunge (1868)
catechol	Adler (1904)
guaiaconic acid	Shaer (1898)
guaiacum	Schoenbain (1857)
hydroquinone	Bertrand (1894)
pyrogallol	Bach and Chodat (1904)
tannin	Lindet (1895)
Compounds with 2 NH_2 groups	
benzidine	Adler (1904)
paraphenylene-diamine	Weber (1902)
paradiethylpara-phenylenediamine	Utz (1903)
tetramethylpara-phenylenediamine	Wurster (1886)
Compounds with 1 OH 1 NH_2	
Nadi reagent	Spitzer (1897)
Reduced Color Bases	
Leucomalachite green	Adler (1904)
Leucorosolic acid	Kastle and Mason (1906)
Phenolphthalein	Kastle and Shedd (1901)
Ethylphenolph-thalein	Kastle (1906)

J. H. Kastle. The oxidases and other oxygen—catalysts concerned in biological oxidations. U. S. Hygienic Laboratory (Treasury Department) Bull. 59, 1-164, December, 1909. (467 references.)

TABLE IV—Action of Peroxidase—H_2O_2



regeneration of enzyme activity after destruction. This regeneration is well recognized and has long been known to occur with proteolytic enzymes and peroxidase, Hand[26], Schwimmer[27]. There is no indication, however, that significant regeneration of peroxidase occurs in vegetables during freezing storage or that it contributes to the formation of off-flavors.

When Is Blanching Sufficient?

The scalding procedure is influenced by factors determining heat penetration such as size and shape of individual vegetable or vegetable parts, temperature of the vegetable tissue and its heat conductivity; also the temperature of the scalding medium, the relative motion of the medium and vegetables, and the nature of this medium. Several of these heat transfer determinants have been evaluated. Biological factors including the variety, maturity and growing conditions also influence rate of heat inactivation of the particular enzyme systems used as test enzymes. The slowness of heat penetration except into small pieces of vegetables (such as individual peas) leads to ununiformity of heat treatment. Thus, the surface layers are subjected to more intense heating than the interior.

The distribution of the enzyme systems, both as to type and concentration, also is known to vary in a particular vegetable. As a rule peroxidase activity is most intense in those portions of the tissue where respiratory and other metabolic activity are greatest, and the rate of thermal inactivation varies in different plant structures.

Thus, Mergentime[29] found that peroxidase reaction (towards guaiacum) of baby lima beans is quite strong in the skin but weak in the cotyledon. Joslyn has observed that the rate of inactivation of peroxidases of peas and beans is much slower in the skins than in the cotyledons. In sweet corn the peroxidase activity of the meat of the kernel is readily destroyed by scalding but that in the skin, particularly near the base where it is attached to the cob, is quite heat resistant, Mergentime[29]. Mergentime found the guaiacum-blueing property of the corn cob tissue to be so strong, and so heat-stable that it was possible to use it to detect pieces of cob in an adequately scalded cut corn pack. Bullis and Wiegand[30] reported corn cob tissue to contain more peroxidase than the kernel and to require a longer blanch time for satisfactory inactivation than the kernel tissue. Vegetable tissue damaged as a result of suboxidation, owing to improper storage conditions, gives a particularly intense peroxidase reaction in the localized damaged tissue, Phaff and Joslyn[31].

The biological factors influencing the distribution of a particular enzyme system in the plant tissue, the occurrence of heat-stable catalytic systems that might affect the test used, or of other factors that might affect the thermal rate of destruction, are not known. An indication of the magnitude of the effect is shown in Table II. Here a comparison is made between the time required to inactivate peroxidase: in the tissue, when the vegetables were heated in water at the temperatures noted; and required to inactivate the peroxidase in juice obtained from the same vegetables after freezing storage for several years, then grinding and expressing by hand through four layers of cheesecloth. Three ml. samples of the juice brought to room temperature were pipetted into ½ x 4 in. thin-walled test tubes and heated in an agitated water bath for the times specified. Less than 1 minute was required to bring the juice to bath temperatures.

Catalase Test

The thermal inactivation of catalase in some vegetable tissues occurs at a rate closely parallel to inactivation of the enzymes concerned in the development of off-flavors. Where this is true, catalase activity may be used as a criterion of the adequacy of scalding. The first correlation of this was reported by Diehl, Dingle and Berry[14] who found that Alderman peas scalded at various temperatures for times long enough to inactivate catalase (qualitatively) did not form undesirable odors and did not change in color when stored at 20 deg. F. for four months. On the basis of these and subsequent investigations the evolution of oxygen from hydrogen peroxide was suggested as a general qualitative test to determine whether the scalding inactivated the "respiratory enzymes" sufficiently for flavor retention during freezing storage. Tressler[18] suggested catalase as a test enzyme in 1932, and in the first edition (1936) of his book[32] he presented a method for semi-quantitative determination. Diehl, Wiegand and Berry[33] described the qualitative method as they used it in 1939, and Mergentime presented it in more detail[28]. Subsequently Diehl[34] reported the hydrogen peroxide test reliable for peas, snap and lima beans but less useful for corn. In 1940, he reported, "As in the case of cut corn, the qualitative test for catalase activity as an index of scalding in asparagus is unreliable"[35]. Mergentime[28, 29] reported success in using catalase as a test enzyme in scalding peas, snap beans, lima beans, spinach, asparagus and corn on the cob, but preferred peroxidase for broccoli, cauliflower and cut corn.

The enzyme, catalase, catalyzes the decomposition of hydrogen peroxide into water and gaseous oxygen. When a vegetable tissue is crushed so as to break the cells (thus liberating the enzyme present in the cells) and it is then covered with a solution of hydrogen peroxide, a vigorous visible evolution of oxygen gas bubbles at the surface will occur, and if very active catalase is present, the whole solution will froth.

Our present knowledge of the chemistry of catalase and its action is summarized by Sumner[36], and Sumner and Somers[37]. Catalase is rapidly destroyed by hydrogen peroxide particularly in pure or purified preparations and, for this reason, the temperature optimum for the reaction is 0 to 10 deg. C. Catalase activity can be measured by determining either the amount of hydrogen peroxide remaining after catalase has acted for definite time intervals at 0 deg. C. or the amount of oxygen gas evolved. Various technics and different apparatus are available for this. The optimum conditions for the quantitative determination of catalase were fixed by Euler and Josephson in 1927 as pH 6.8, 0 deg. C., and 0.01 N hydrogen peroxide. Balls and Hale[38], in the iodometric method they developed for the estimation of catalase in agricultural products, use a reaction mixture at pH 7.0, 0 deg. C., and 0.004 N in H_2O_2. These hydrogen peroxide concentrations, 0.017 percent and 0.00068 percent respectively, are much lower than the concentrations (approximately 3.0 percent) commonly used at room temperature.

Diehl *et al.*[33] describe the catalase test they used as follows:

"As commonly done, this test consists in breaking some of the scalded material into small pieces and placing these fragments in a clean test tube or glass. About two teaspoonfuls of active hydrogen peroxide, obtainable at any drug store, are added and continuous bubbling of gas from tissue pieces

is watched. When no bubbling is observed, the scalding is deemed sufficient to insure against any undesirable odor and flavor in the product during storage. If the degree or type of gas evolution from unscalded tissues is observed by treating some raw material with hydrogen peroxide, no difficulty will be encountered in interpreting the test."

How to Test for Catalase

In making qualitative tests for catalase, in connection with studies on the relation of the extent of enzyme inactivation to flavor retention in frozen vegetables during the period of 1933-1940, we have preferred to use a freshly prepared 0.5 percent hydrogen peroxide solution. Since some samples of the hydrogen peroxide as bought contain preservatives that interfere with the test, only fresh acetamide-free hydrogen peroxide should be used. This is bought at 3-percent strength and is freshly diluted at 1 vol. to 4 vol. of water. An amount of vegetable tissue not over 5 grams, after thoroughly crushing, is placed in a large test tube, covered with 5 c.c. of water and then 1 c.c. of the 0.5-percent hydrogen peroxide is added. The mixture is shaken and observed in 1 to 2 minutes. A continuous stream of small gas bubbles, evolved at the surface of the vegetable tissue, and rising to the surface of the liquid in the test tube is taken as evidence of catalase activity. In making the test on scalded vegetables, typical material should be selected including some of the thickest pieces taken from positions least likely to have been exposed to heat; and the scalded vegetable cooled to room temperature. Since the hydrogen peroxide purchased at the drug store may have deteriorated in strength, the effectiveness of the prepared solution should be tested with both fresh vegetable tissue and the same vegetable tissue boiled for 10 minutes. The former should give a strong reaction, the latter none. In making the observations, slowly evolved bubbles originating from trapped air and gas evolution occurring after 2 min. are disregarded.

There is little consistency in the procedures used by various investigators for the qualitative detection of catalase activity. The discrepancies in results reported in the literature as to the reliability of the catalase test are due in part to the variation in concentration of hydrogen peroxide and relative quantities of peroxide and tissue. These variations in results would have been greater if it were not for the inherent difficulty of determining the point at which complete destruction of the catalase occurred. It is not easy to differentiate between 90 percent complete inactivation and complete inactivation by qualitative tests. Furthermore, catalase in vegetable tissue is much more resistant to hydrogen peroxide than catalase in partly or completely purified state. Even vegetable extracts and juices behave differently from suspensions of coarse particles of tissue.

When the catalase content of vegetable tissue is determined by quantitative methods, such as that of Balls

TABLE V—Comparative Specificity of Vegetable Peroxidase Systems (1940)

Substrate	*Apple (Gravenstein)*	*Asparagus (M. Washington)*	*Artichoke (Globe Hearts)*	*Beans, Green (Kentucky Wonder)*	*Beans, Lima (Henderson Bush)*	*Beans, Horse (Flat Beans)*	*Brussels Sprouts*	*Cauliflower*	*Horseradish*	*Peas (Laxton Progress)*	*Squash Green Italian*	*Squash Yellow Italian*	*Squash Summer*	*Spinach*	Coloration* Reagent	Coloration* Test Solution
Compounds with 1 free OH																
o-cresol	−	−	−	++	−	++	±	−	5+	+	++	+++	+++	−	Colorless	Antique brown
m-cresol	−	−	−	−	−	+	−	−	±	−	−	−	−	−	Colorless	Light mineral gray
p-cresol	−	−	±	+	−	+	−	−	−	−	−	−	−	−	Very light yellow	Light mineral gray
guaiacol	−(?)	+	−	5+	++	5+	4+	+	5+	5+	5+	5+	5+	5+	Colorless	Terra cotta
hydroquinone monomethyl ether	±	−	+	+	+	++	+	−	+	±	5+	+	+	+	Slight yellow	Colonial buff
phenol	−	−	−	5+	−	+	−	−	5+	±	++	4+	5+	−	Colorless	Light mineral gray
α—naphthol	−	±	−	5+	+	4+	5+	+	5+	+	4+	5+	+++	+++	Colorless	Light mineral gray
vanillin	−	+	±	+	+	5+	+	−	+	+	++	+	+	+	Colorless	Light pink cinnamon
Compounds with 1 free NH_2																
aniline	−	−	−	+	−	++	−	−	+++	−	+	+	−	−	Colorless	Light mineral gray
o-toluidine	−	−	−	+	−	+	−	−	+++	−	+	+	+	−	Colorless	Light mineral gray
m-toluidine	−	−	−	+	−	+	−	−	4+	±	+	+	+	±	Very light amber	Light mineral gray
p-toluidine	−	+	−	++	−	++	++	−	+++	+	++	++	++	++	Colorless	Natal yellow
Compounds with 2 or more OH																
adrenaline	−	++	+	+	+	++	+	−	+	++	+	+	+	+	Colorless	Buckthorne brown
catechol	+	+	5+	5+	5+	5+	5+	+	5+	5+	5+	5+	5+	5+	Colorless	Natal brown
chlorogenic acid	−	+	+	+	+	++	+	+	+	+	+	+	+	+	Colorless	Old gold
gallic acid	−	5+	5+	5+	5+	5+	+++	−	++	4+	5+	++	++	5+	Very light yellow	Roman green
gum guaiac	−	++	+	+++	++	++	++	+	+++	++	+++	4+	+++	+++	Antique brown	American green
gum guaiac	+	+++	++	+++	++	++	++	++	+++	+++	4+	4+	4+	4+	Pyrite yellow	American green
hydroquinone	+	++	4+	5+	5+	5+	4+	+	4+	+++	5+	4+	5+	+++	Colorless	Garnet brown
hydroxyhydroquinone	+++	+++	+	+++	4+	+++	+++	+++	4+	++	+	+++	+++	4+	Orange buff	Tiger brown
naphthoresorcinol	+	+++	+	+++	++	++	++	+	+++	++	++	+++	+++	+++	Orange citrine	Flame scarlet
phloroglucinol	−	−	−	−	−	−	−	−	+	−	−	+	−	−	Colorless	Light mineral gray
pyrogallol	+	5+	+++	5+	5+	5+	4+	+	5+	5+	+++	5+	4+	5+	Colorless	Argus brown
quercetin	+	+	+	++	++	++	+	+	+++	+	++	++	+++	+	Maple red	Olive lake
quercitrin	+	+	−	++	+	+	++	+	++	+	+	+	+	+	Mars orange	Olive lake
resorcinol	−	−	+	+	−	+	−	−	+	+	+	−	+	−	Colorless	Honey yellow
tannic acid	−	+	−	+	+	+	+	+	+	+	+	+	+	+	Buff yellow	Dark olive buff
tannin (oeno)	+	++	+	++	++	++	++	+	+++	++	++	++	++	++	Noble red	Terra cotta
Compounds with 2 NH_2 groups																
benzidine	+	+	±	+	+	++	+	−	+	+	++	++	++	++	Colorless	Light drab
pfp-aminodimethylaniline	5+	5+	+	5+	5+	5+	5+	5+	5+	5+	5+	5+	5+	5+	Carmine	Blue green black
o-phenylenediamine	++	+	±	5+	4+	5+	5+	++	5+	+++	++	5+	5+	5+	Xanthine orange	Orange citrine
m-phenylenediamine	−	±	±	+++	±	++	4+	−	+++	+	+	+	+	+	Colorless	Buffy citrine
p-phenylenediamine	5+	5+	−	5+	5+	5+	5+	5+	5+	5+	5+	5+	5+	5+	Light maroon	Blackish purple
Compounds with 1 OH 1 NH_2																
o-aminophenol	++	+++	±	5+	+++	5+	4+	+	5+	++	+++	5+	5+	4+	Zinc orange	Kaiser brown
m-aminophenol	−	+	±	4+	+	+++	++	−	5+	+	4+	++	++	+	Slight yellow	Old Gold
p-aminophenol	5+	5+	+	5+	5+	5+	5+	+++	5+	5+	+++	5+	5+	5+	Morocco red	Natal brown
2-amino-4-nitrophenol	5+	4+	5+	5+	5+	5+	5+	5+	5+	4+	5+	5+	5+	5+	Mahogany red	Morocco red
5-aminosalicylic acid	+++	5+	±	4+	4+	5+	5+	+++	5+	5+	5+	5+	5+	5+	Colorless	Anthracene purple
Nadi reagent		−	5+							+					Colorless	Livid purple

* Color names after R. Ridgway. Color Standards and Color Nomenclature, Washington, D.C., 1912.

TABLE VI—Specificity of Horseradish Peroxidase

Substrate	Hydrogen Peroxide Utilization*	Color Indicator
Compounds with 1 free OH		
o-cresol	+	+
m-cresol		0
p-cresol	+	0
ferulic acid	+	
guaiacol	+	+
guaiacol sulfonic acid	+	
hydroquinone monomethyl ether	+	+
phenol		+
α-naphthol	0	+
vanillin	+	+
Compounds with 2 or more OH		
adrenaline		
catechol	+	+
chlorogenic acid		+
gallic acid	+	+
hydroquinone	+	+
hydroxyhydroquinone		+
naphthoresorcinol		+
phloroglucinol	0	+
protocatechuic acid	+	
pyrogallol	+	+
purpurogallin	+	
resorcinol	0	+
tannic acid	0	+
Compounds with 2 NH_2		
benzidine		+
o-phenylenediamine	+	+
m-phenylenediamine	0	+
p-phenylenediamine	+	+
p-aminodimethylaniline		+
Compounds with 1 NH_2 1 OH		
o-aminophenol	+	+
m-aminophenol	0	+
p-aminophenol	+	+
2 amino-4-nitrophenol	+	+
5-aminosalicylic acid	+	+

*After A. K. Balls and W. S. Hale. On peroxidase. *Journal Biological Chemistry 107*, 767-782, 1934.

and Hale,[38] its reliability as an index of adequacy of scalding is poorer. Thus Arighi, Joslyn and Marsh[18] found that catalase was quantitatively inactivated at a much faster rate than enzymes concerned in off-flavor production in peas and spinach. The catalase factor was 0 in peas scalded for 2 minutes at 65 deg. C. (149 deg. F.) whereas it was necessary to heat at 180 deg. F. for 2 minutes for flavor retention over a prolonged storage period. The same was true with snap beans, Bedford and Joslyn.[20] In asparagus, Joslyn and Bedford[21] found that catalase was more heat resistant both quantitatively and qualitatively; catalase activity persisted in commercially overblanched material. Bullis and Wiegand's data[30] indicate that catalase is more heat resistant than peroxidase in corn kernel tissue.

The use of catalase activity as an index of adequacy of scald, particularly when the less reliable qualitative tests are used, is not a generally reliable method of determining adequacy of scalding. For peas and lima beans the minimum scalding necessary to inactivate catalase qualitatively is generally adequate to prevent off-flavor formation in freezing storage. Some variation in catalase activity in lima beans has been reported correlated with growing conditions; thus, Smart and Brunstetter[39] found catalase in Maryland grown lima beans to be more heat resistant than that found by Tressler for New York grown beans. They recommended a scalding period longer than that necessary to inactivate catalase at 212 deg. F., and less than that necessary to inactivate catalase at 190 deg. F. Similarly for spinach and kale they found that blanching for times not quite long enough to destroy catalase yielded products of best quality.[40] For corn and asparagus, catalase inactivation is not necessary for flavor retention.

Peroxidase Test

In investigations of Joslyn *et al.* (1933-1940), peroxidase activity was found more closely to parallel enzymes involved in off-flavor formation than catalase; but this correlation varied markedly with the nature of the substrate used for detecting peroxidase activity. Not only does the relative activity of the peroxidases of a particular vegetable tissue vary with the indicator used, but the apparent rate of thermal inactivation of the vegetable peroxidases *in situ* also varies with the indicator. Consequently it is necessary to select the proper indicator for the particular vegetable tested. In the early investigations before this principle was established, the use of benzidine as an indicator for peroxidase activity in peas, string beans and spinach led at first to the tentative conclusion that "Peroxidase may not be the chief causative agent involved in deterioration of unblanched or underblanched vegetables," Joslyn and Marsh.[41]

Peroxidases are widely distributed in plants and occur also in animal tissue. The doubt which existed concerning the occurrence of peroxidase in animal tissues that contain hemoglobin, cytochromes and other substances, which themselves give tests for peroxidases, was dispelled by the separation and isolation of peroxidase from the leucocytes by Agner.[42] To date, four peroxidases have been isolated in pure crystalline form and their structure determined, viz. (a) horseradish peroxidase; (b) verdoperoxidase; (c) milk peroxidase, and (d) cytochrome–C–peroxidase.[43] The

TABLE VII—Comparison of Peroxidase Indicators in Unblanched, Blanched and Overblanched Tissues

Reagents	Asparagus			Peas			Spinach		
	No blanch	212-2*	212-5	No blanch	180-2	212-2	No blanch	212-2	212-3
Compounds with 1 OH									
o-cresol	−	−	−	2+	−	−	−	−	−
m-cresol	−	−	−	±	−	−	−	−	−
p-cresol	−	−	−	−	−	−	−	−	−
guaiacol	+	−	−	+	+	−	5+	−	−
hydroquinone monomethyl ether	−	−	−	+	±	−	+	−	−
phenol	−	−	−	+	−	−	2+	−	−
α-naphthol	+	−	−	+	+	−	2+	+	−
vanillin	+	+	+	+	±	+	+	+	+
Compounds with 1 NH_2									
aniline	−	−	−	±	−	−	−	−	−
o-toluidine	−	−	−	−	−	−	−	−	−
m-toluidine	−	−	−	±	−	−	±	−	−
p-toluidine	+	−	−	+	−	−	2+	−	−
Compounds with 2 OH									
adrenaline	2+	−	−	2+	±	−	+	−	−
catechol	+	+	−	5+	3+	+	5+	−	−
chlorogenic acid	+	+	±	+	±	−	+	−	−
Compounds with 2 OH									
gallic acid	5+	2+	−	5+	2+	±	5+	−	−
gum guaiac	2+	−	−	3+	+	±	2+	−	−
gum guaiac	3+	+	−	3+	+	−	4+	−	−
hydroquinone	2+	2+	+	3+	3+	+	3+	±	−
hydroxyhydroquinone	3+	2+	2+	4+	2+	2+	4+	+	+
naphthoresorcinol	3+	3+	+	3+	2+	+	3+	+	+
phloroglucinol	−	−	−	−	−	−	−	−	−
pyrogallol	5+	3+	+	5+	3+	3+	5+	±	±
quercetin	+	+	+	+	+	+	+	+	+
quercitrin	+	+	+	+	+	+	+	±	−
resorcinol	−	−	−	+	−	−	+	−	−
tannic acid	+	+	+	+	+	+	+	−	−
tannin	2+	+	+	3+	+	+	2+	±	±
Compounds with 2 NH_2									
benzidine	+	±	−	+	+	−	2+	−	−
p-aminodimethylaniline	5+	5+	5+	5+	3+	2+	5+	5+	5+
o-phenylenediamine	+	+	+	3+	3+	+	5+	+	+
m-phenylenediamine	±	−	−	+	−	−	+	−	−
p-phenylenediamine	5+	5+	5+	5+	5+	2+	5+	5+	5+
Compounds with 1 OH, 1 NH_2									
o-aminophenol	3+	2+	+	5+	3+	+	4+	+	+
m-aminophenol	+	−	−	+	−	−	+	+	−
p-aminophenol	5+	5+	2+	5+	2+	+	5+	2+	+
2-amino-4-nitrophenol	4+	4+	4+	5+	4+	4+	5+	4+	4+
5-aminosalicylic acid	5+	5+	−	5+	+	±	5+	±	−

* Indicates temperature of blanching water in deg. F., and time of blanching in minutes.

TABLE VIII—Extent of Enzyme Inactivation Necessary for Flavor Retention

Vegetable	*Storage Period*	*Investigator*	*Inactivation*	
			Peroxidase Percent	*Catalase Percent*
Artichoke hearts	1 year at 0° F.	Joslyn, Bedford and Marsh (1938)	100	99.5
Asparagus:				
Martha Washington	4.5 years at 0° F.	Joslyn, and Bedford (1940)	100	100
	2.5 years at 0° F.	Joslyn, and Bedford (1940)	100	99.5
Mary Washington	4 years at −5° F.	Masure and Campbell (1944)	100	—
Beans, green cut:	4 years at 0° F.	Bedford and Joslyn (1939)	97	100
Kentucky Wonder	1 year at 0° F.	Bedford and Joslyn (1939)	90	100
Blue Lake	4 years at −5° F.	Masure and Campbell (1944)	96	—
Beans, Lima:				
Fordhook	4 years at −5° F.	Masure and Campbell (1944)	96	—
Henderson Bush	4 years at −5° F.	Masure and Campbell (1944)	100	—
Corn, cut	4 years at −5° F.	Masure and Campbell (1944)	95–98.5	—
Corn, on cob	——	Bullis and Wiegand (1945)	99.5–100	99–100
Peas:	1 year at 0° F.	Arighi, Joslyn and Marsh (1936)	98.0–99.0	100
Miracle	4 years at −5° F.	Masure and Campbell (1944)	50–100	—
Spinach	4 years at 0° F.	Arighi, Joslyn and Marsh (1936)	99–100	100

latter is unique in that it catalyzes the oxidation by hydrogen peroxide of ferro-cytochrome-C only. The other three peroxidases, in the presence of hydrogen peroxide, catalyze the oxidation of a great variety of substrates including aromatic amines, phenols, diamines, ascorbic acid, ferro-cytochrome–C, iodides to iodine, etc. Horseradish peroxidase was used for a long time as a typical plant peroxidase, but accumulating data show that plant peroxidases may differ from each other in their affinity for hydrogen peroxide,[44] their heat stability and specificity with regard to reducing substances.

A large number of indicators have been proposed for testing for peroxidases. Kastle[45] listed some 40 compounds all of which have the property of being converted into readily observable intensely colored compounds on oxidation by hydrogen peroxide in the presence of peroxidase. (See Table III.) These indicators differ in their specificity, ease of oxidation and other properties. In the early investigations, the action of peroxidases was investigated almost entirely with these chromogenic substances and the measurement of enzyme activity depended upon the formation of colored products. The earlier colorimetric methods of peroxidase assay were not very satisfactory from a quantitative, or even a qualitative, point of view. The rate of pigmentation during enzymatic reaction is not necessarily proportional to rate of oxidation, for pigment development is markedly influenced as to degree and color by factors such as pH, presence of reducing agents such as ascorbic acid that may retard color development for some time, and other factors. The chemistry of the oxidation products produced is quite complicated, for although the first stage in the oxidation, e.g., quinone formation from hydroxybenzenes, is fairly simple, the final colored product is quite complex. For example, purpurogallin, a complex condensation product is obtained from pyrogallol, quinhydrone and higher oxidation products from hydroquinone, and the salt of the condensation product between diphenolquinonediimine and unaltered benzidine, which forms as a final, difficulty soluble, blue product from benzidine. The chemical transformations involved are shown for typical substrates in Table IV. [See Hand,[26] Sumner and Somers.[37]] Balls and Hale[46] used, as a measure of peroxidase activity, the volumetric determination of residual hydrogen peroxide and were able to extend our knowledge concerning some phases of horseradish peroxidase.

The chromogenic indicators have been widely used until very recently in investigating peroxidase activity and under controlled conditions are reliable both for qualitative and quantitative measurements. One great difficulty with these peroxidase reagents is that to some extent they are all oxidized by hydrogen peroxide alone or when thermostable metallic catalysts (chiefly iron and copper salts) are present. Benzidine is least reliable in this respect, but guaiacol is not without fault, particularly in the presence of certain iron-porphyrin complexes. Certain heat stable compounds that occur in localized areas in vegetables act as such catalysts. Consequently the indiscriminate application of peroxidase reagents in testing for adequacy of scalding is unwise, and the results of such tests should be interpreted with caution.[31]

To standardize the various possible indicators, extracts of unblanched, properly blanched and overblanched vegetables were prepared by triturating 100 g. of ground frozen vegetables stored from 3 to 7 years at 0 deg. F. with 100 g. of washed quartz sand and 1 liter of 0.2 M phosphate buffer at pH 7. The extracted tissues were pressed out and the extract was allowed to settle. Then 9 ml. portions of the supernatant liquid were dispensed into test tubes. Next 0.5 ml. of 2-percent hydrogen peroxide were added, followed by 0.5 ml. of 1-percent alcohol solution of some 40 test reagents. Immediately after addition of the reagent the solutions were shaken and observed for intensity and stability of color. Some of the data obtained in these tests carried out* in 1940 are shown in Tables V, VI and VII. Table V compares the intensity of color reaction observed in various raw vegetables. In Table VI is shown a comparison between the qualitative tests with horseradish extracts with data obtained by Balls and Hale[46] with hydrogen peroxide utilization as a test for the ability of the compounds tested to serve as substrates. Table VII shows the comparison between the intensity of reaction in underblanched and overblanched vegetables. Only those reagents which give a strong positive reaction in unblanched tissues, and a negative reaction in tissues blanched sufficiently for flavor retention, are suitable as test reagents. On the basis of such tests it was found that gum guaiac was preferable to benzidine in our early tests, and guaiacol was selected as the most useful general reagent because it was more stable than guaiacum and more specific than benzidine. Cruess and Joslyn.[47]

As in the case of catalase, quantitative determinations of peroxidase activity by a modification of the Balls and Hale method[48] have not always agreed with qualitative tests suitably standardized. In the case of string

TABLE IX—Effect of Hydrogen Peroxide Concentration on Peroxidase (Guaiacol) and Catalase Activity in Fresh Vegetable Tissue*

H_2O_2, *Percent*	*Catalase*			*Peroxidase*		
	Asparagus	*Peas*	*Spinach*	*Asparagus*	*Peas*	*Spinach*
0.005	±	−	−	−	−	−
0.01	±	++	−	+	−	+++
0.025	+	++	−	++	±	+++
0.05	+	++	−	++	+	4+
0.075	++	+++	±	++	4+	5+
0.1	+++	+++	+	+++	4+	5+
0.15	+++	+++	+	4+	4+	5+
0.20	+++	4+	+	4+	4+	5+
0.25	+++	4+	++	4+	4+	5+
0.30	4+	4+	++		4+	5+
0.35	4+	4+	++	+++	4+	5+
0.40	4+	4+	++	+++	5+	5+
0.50	4+	4+	+++	++	4+	5+
1.0	4+	5+	4+	++	4+	5+
2.0	5+	5+	5+	+	4+	5+
3.0	5+	5+	5+	+	4+	5+
4.0	5+	5+	5+	+	4+	5+
5.0	5+	5+	5+	+	+++	4+

* From data obtained by T. Shearing in our laboratory.

*With the assistance of Dr. C. L. Bedford.

beans, Bedford and Joslyn[20] found that the peroxidase activity, as measured by the rate of decomposition of hydrogen peroxide in the presence of pyrogallol, is definitely more resistant to heat inactivation than catalase and is closely correlated with keeping quality. The qualitative test indicated that "benzidine peroxidase" of beans was surprisingly thermostable while the guaiacum peroxidase was inactivated in samples that were found quantitatively to be low in peroxidase. With asparagus the gum guaiacum test was found to give a good indication of sufficient enzyme inactivation for flavor retention while the benzidine test was not reliable. On the other hand, Bullis and Wiegand[30] report that the benzidine test more nearly indicates the amount of peroxidase present in corn than does the guaiac test but they give no flavor comparison. Mergentime[28] reported the gum guaiac test satisfactory for peas, broccoli and cauliflower; and Masure and Campbell[49] reported the guaiacol test adequate for cut corn, asparagus, lima beans, snap beans and peas.

There is yet little information concerning the percentage inactivation of peroxidase required to retain flavor over prolonged storage. All of our data indicate that complete inactivation of peroxidase (measured by H_2O_2 utilization in presence of pyrogallol) is not necessary even for storage of 3 to 7 years at 0 deg. F.; but most of the initial activity must be destroyed. Tressler[15] suggested 99 percent inactivation of both catalase and peroxidase, but gave no data. The data, which we have obtained during 1933-1940, only a portion of which has been published, indicate that the percentage of inactivation need not be as high as that for all vegetables; and this is supported by the data obtained by Bullis and Wiegand[30] and Masure and Campbell.[49] The available published data are summarized in Table VIII. There is a strong indication that non-enzymatic chemical action occurs during prolonged storage but the significance of this in relation to commercial practice is not known. [See Joslyn and Bedford.[21]]

How to Test for Peroxidase

The colorimetric test for peroxidase activity is valid only when the mixture is properly balanced with respect to enzyme content (relative weight of vegetable tissue), color base or reagent, and hydrogen peroxide concentration. The relative concentration of reagent and hydrogen peroxide used by enzyme chemists is based largely on the original work of Willstätter and Stoll (1918) who reported the optimum conditions for purified horseradish peroxidase to be: 0.25 percent pyrogallol, 0.0025 percent hydrogen peroxide at pH of about 6, and 20 deg. C. Balls and Hale[48] recommend: 0.25 percent pyrogallol, 0.0027 percent hydrogen peroxide, pH 8, at 30 deg. C. Sumner and Gjessing[50] use in their final mixture: approximately 0.5 percent pyrogallol, 0.05 percent hydrogen peroxide, at pH 6.0. While these low concentrations of hydrogen peroxide are satisfactory for purified enzyme preparations or for low dilutions of vegetable extracts which contain relatively small amounts of reducing substances, such as ascorbic acid or active catalase (pyrogallol oxidation is not affected by catalase particularly in slightly alkaline solution), higher concentrations are required with vegetable extracts or macerates high in catalase and reducing substances.

Even with purified peroxidase extracts, differences exist. Thus Sumner and Gjessing[50] report the optimum concentration of hydrogen peroxide in their modified method to be: 0.025 percent for turnip and horseradish peroxidase and 0.2 percent for milkweed peroxidase. Much higher concentrations of hydrogen peroxide may be used with larger quantities of vegetable tissue containing active catalase and considerable amounts of ascorbic acid. Recent tests, in which 5 grams of ground vegetable tissue, 5 c.c. of water, and 1 c.c. of 1-percent tincture of reagent and 1 c.c. of hydrogen peroxide were used as a base for qualitative test, indicated that the concentration of hydrogen peroxide present initially in the mixture could be varied over a wide range without serious effect on intensity of coloration. (See Table IX.) The optimum conditions for enzyme activity, when measured either colorimetrically or volumetrically, vary with type of color base added as well as with source of enzyme. In using guaiacol for quantitative assay, Masure and Campbell[49] use a mixture containing 0.02 percent guaiacol, 0.0035 percent hydrogen peroxide, and vegetable extract equivalent to ⅔ gram of tissue per 24 c.c. of mixture in citrate buffer of pH 4.5.

For qualitative test under plant conditions we have found the following conditions generally satisfactory:

A 1-percent guaiacol solution. A solution of 1 ml. of guaiacol in 100 ml. of 95-percent alcohol. It should be replaced when it becomes badly discolored or shows a precipitate. The guaiacol used should be clear, colorless or slightly amber in color. Where other test reagents are used, e.g., catechol, tinctures of the same strength should be prepared. Gum guaiacum as purchased in drug stores varies in quality. In using it, grind 1 gram of the gum in a porcelain mortar with a little alcohol, decant into a graduated cylinder and continue with other portions of alcohol. Allow to settle, then decant off the clear tincture. A straight alcohol extract is more stable than that prepared by extracting with 50-percent alcohol. If the latter is used, grind the gum with successive portions of 50 c.c. of water, then add 50 c.c. of alcohol to the extract, shake, allow to settle, and decant.

A 0.5 percent hydrogen peroxide solution. A solution of 10 ml. of 3 percent hydrogen peroxide (10 volume) in 50 ml. of distilled water. This solution should be made up freshly, as it deteriorates quickly. The purchased peroxide should be free from preservatives or inhibitors which might affect the test. Since the 3-percent peroxide is often below strength, it is better to use 30-percent (100 volume) hydrogen peroxide (which should be stored at 32 to 40 deg. F.). The peroxide should be protected from light by using a dark colored bottle.

Testing reagents. To check the effectiveness of the reagents a small quantity of fresh vegetables should be tested as shown below. A similar quantity should be boiled for about 10 minutes in water, cooled and then tested. The former should give a strong reaction; the latter, none.

Procedure with Guaiacol

1. In sampling scalded vegetables for extent of inactivation of peroxidases, select those portions that are exposed to least heating, for example, central portions of the thickest and largest prices from positions farthest removed from surfaces exposed to scalding medium. Cool the scalded material to room temperature before use.

2. Cut or break the pieces to expose the inner tissues (use stainless steel in cutting knife). Grinding with a porcelain mortar and pestle is desirable but not necessary. Place about 5 grams of the tissue into a test tube 1 inch in diameter; this should fill the test tube to a depth of about 1 inch.

3. Add 5 ml. of water (sufficient

(*Turn to page* 238)

EDITORIALS

LAURENCE V. BURTON, Editor

Operation Crossroads

THAT first atomic bomb test seems to have been a great disappointment—like the phony war in 1940. But tests are conducted to discover facts, not to entertain the curious or the bored.

The attitude of some commentators is that anything less than total destruction is a failure. It reminds us of a poorly planned test of packages where each box was dropped until it fell apart, after which everybody wondered what had been learned and was completely in doubt about which style of package protected the contents best.

Suppose the entire target fleet had been sunk by a single bomb? What knowledge could have been gained thereby that would lead to improved ship design? Actually, we measured pressures, temperatures and radioactivity, and can later correlate these figures with the extent of the damage inflicted. Only by such information is the Bikini test worth anything to the nation.

Forty Years With the Food Law

WHAT we believe is the most important benefit to food manufacturers resulting from the federal Food and Drug Acts of 1906 and 1938 was completely overlooked by a series of laudatory speakers at the "40th Anniversary Tribute to Food and Drug Law" on June 25, at the Association of the Bar, New York. The omitted benefit was the compulsion to understand their businesses from the technological side, which is indirectly exerted by the law. Until the F&DA came into being, there was no real incentive for the development of what is now known as food technology. Well do we recall a manufacturer who told us privately in 1908 that the only profits in his business were made by adulteration—that anybody who tried to manufacture an unadulterated product in his line would go broke. Under such a condition any technological search was usually directed toward cheaper substitutes, ways and means of avoiding the cost of the genuine article, and the use of certain chemicals of dubious merit to prevent spoilage, all because next to nothing was known about the technology of food preservation.

Probably the first firm to benefit materially from the food law was a well-known catchup company. Prior to the enactment of the law they had discovered how to make a "no-preservative" catchup. Old timers will recall that everybody once used 0.1 percent of sodium benzoate. The company had realized the merchandising possibilities of a product that would keep without benzoate after it was opened. In time they discovered that a formula with about 25 percent sugar vs. the then customary 12 to 16 percent, plus a little extra acidity from vinegar, would not spoil after opening. But as long as 0.1 percent of benzoate was cheaper than 10 percent of sugar the possibility of marketing the new formula profitably was remote. The new food law supplied the missing prerequisite. In that day there ensued a wild scramble to learn how to meet the new competition. It took years to learn how and why.

The existence of the law gave impetus to the study of food technology that has put the food industry of the United States in its present high state of development. Some countries excel us in specialized lines, but none equals us on the average for all lines. One need only visit nations that have no food laws of our sort to realize that, without this compulsion, our knowledge of what we are doing and why would be far less than we possess today.

While the consumer has benefited from 40 years of food law enforcement, the industry has gained more in the way of technological development through compulsion and by virtue of making honesty profitable. Francis French of the R. T. French Company, mustard manufacturers, told us in 1916 that, after he realized the benefits derived from existence of the food law, it would be cheaper for him to throw $250,000 out the window than revert to pre-1906 conditions.

No one will contend, however, that federal regulation of the food industry has achieved perfection. Enforcement of the law has often caused many hardships, even to food manufacturers of honesty and integrity. There is currently the big problem of definition and standards of identity. The industry is now, as a rule, ahead of the F&DA in technological developments. This, we believe, accounts for much of the controversy over definitions and standards of identity. The burden is now on the F&DA. If the standards problem is properly worked out, the Food and Drug Law will continue, on net balance, to be of real benefit to the food industries.

How to Sell Sanitation

NOT everyone in the management of food processing plants has an appreciation of sanitation, or even of cleanliness and order. While cleanliness and orderliness are largely a matter of proper parental training in youth, an appreciation of sanitation is mainly a matter of education. The food technologist learns it in his college days through his study of bacteriology. But, by what procedure shall sanitation be "sold" to management personnel who may lack this technical education? Ditto for workers?

There is a willful minority who erroneously

lieves that the cost of adequate cleaning and sanitation is an unjustifiable expense. The law, the sheriff and the undertaker will be potent educators of this very small group. It is doubtful if anything less than corporal punishment will produce a lasting impression on men who like to be dirty.

The great majority of food processsors are, however, desirous of cleanliness and sanitation, but often are uninformed. Here is offered one way of selling them on the true implication of adequate plant sanitation:

Sanitation is nothing more than a race between men and lower forms of life to determine who gets the food supply first. For, man, bacteria, molds, insects and rodents all eat the same sort of food. If man loses the race, the food is spoiled and inedible. If man wins the race, he does it by keeping all lower forms of life from eating the food; and the technic of doing this is what is known as sanitation.

If the race comes out a tie, man loses—just as much as man loses a tied race with a locomotive at a railroad crossing.

If man permits a few of the lower forms of life, especially bacteria, to get a head-start (by poor sanitation), he handicaps himself so much that he may tie the race—or lose it entirely.

Adequate sanitation handicaps the lower forms of life and helps man to win the competition.

There is nothing aesthetic or idealistic about it. It's all practical commonsense and has a dollar-and-cent value. Let business management grasp this concept and all will be much better in the food industry.

Reversion Pains

WHILE one cheese assembler had vowed he would resist all price hikes above normal profit margins, here is what he has been forced to do to stay in business. On July 2, it was necessary to offer what had been previous black market prices to small cheese factories. As long as OPA had existed, many of the producers had refused all offers from black market operators and everything was kept at price ceilings, but on July 1 their offers became legal and the producers threatened to switch. This condition, he insists, will be only temporary, that after a few weeks conditions will be normal and that prices to consumers will be about half way between the old OPA ceiling and the black market.

Doing the Impossible

ONE of those experiences that does the heart good was a recent visit to a factory where everything is being constantly improved. The folks have accomplished wonders in the past three years despite all the handicaps and shortages.

One looks in vain for name plates on much special equipment. These are rare because most of it was designed by the production manager, and built in nearby job shops. Things are being done mechanically that, off hand, would seem to be impossible. For example, sucking—not blowing—nut meats from the basement to the roof over the sixth floor—a 90-ft. verical lift. It happens to be one of those cases where the chap didn't realize that it could not be done. So he went ahead and did it.

Better yet, there was no evidence of satisfaction with past accomplishments. On the contrary, there was much talk of present unsolved problems and future improvements. Every unit operation in the place is being regarded critically. The big question is how can it be done faster or cheaper. And, there is a sublime disregard for tradition.

With such an attitude toward its affairs such a company is bound to be an increasing success.

Don't Pyramid Purchases

A FEW signs of the times indicate that the bitter lessons of 1919-20-21 have been forgotten—or else that some contemporary executives are too young to have learned them then. In that day it was considered very smart to over-order by two, three or four times in order to get delivery on what was needed.

It was a grand delirium while it lasted.

Then the bottom fell out and it wasn't funny.

One concern woke up with an inventory of $250,000 in valves and pipe fittings. Another had ten percent of the world's production of gum tragacanth. Another had a three-year supply of another item, and so on. It then became a hey-day for the jobbers who could load up warehouses with surplus equipment and supplies, bought at 10 cents on the dollar of original cost.

The tendency is to repeat the process. If tempted to do so the best advice is: Don't! It can produce an awful headache.

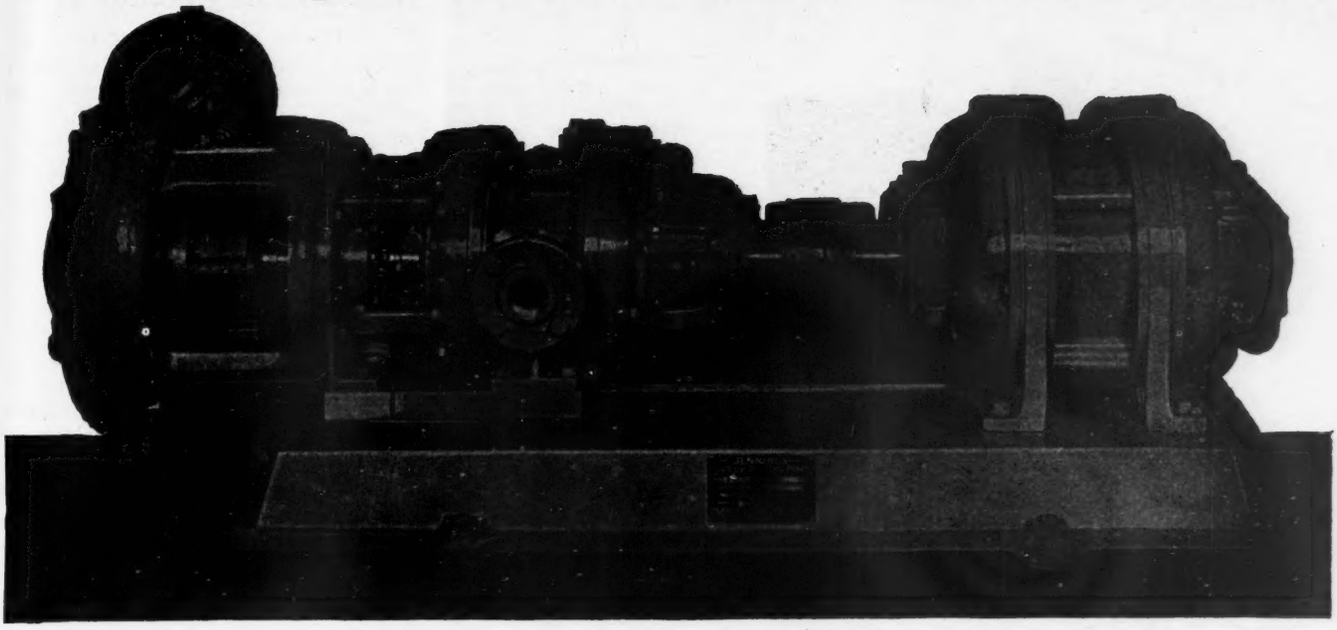
How to Prevent Repeat Sales

AN irate business associate burst into our offices asking if we would like to receive a blistering letter to the editor, or what were we going to do about the way he had been gypped on a frozen pie.

He had been importuned by a charming saleslady to try something new—a frozen pineapple pie. "All you do is put it in the oven." Price, 65 cents, all packaged in a big sealed carton, 12 inches square. When he presented it to his Missus it turned out to be only a 6-inch pie, whereupon he was roundly razzed. And, when the pie was baked, it was of a very mediocre eating quality, which brought down further adverse comment on his judgment and careless purchasing.

This sort of oversized packaging would be illegal in interstate commerce. Questionable packaging and poor quality of product are a combination sure to kill the future of what could be a promising specialty industry.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

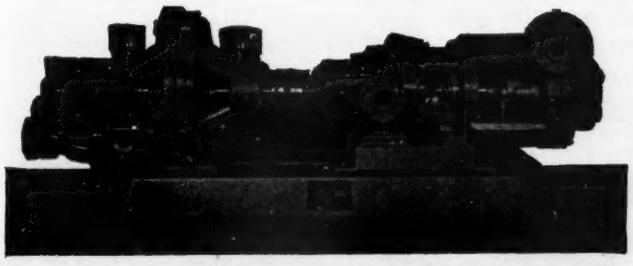


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

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NEW PACKAGES & PRODUCTS

Baker Goes National

THE POPULARITY of baked goods produced for its retail stores in New York City has led Hanscom Baking Corp. to broader horizons.

Packages were developed to suit several of the best sellers, which are being sold now in specialty shops all over the country.

An attractive silver and green confectionery-type box has been chosen both for Hanscom's Rumlets and Rum Patties. The label, used on all packages, is simple but distinctive. The background is green, printing is black and a line of large red polka dots borders the whole thing. A small drawing of a jolly baker is the only other motif.

Rumlets, tiny rounds of cake and confection, are placed in fluted aluminum foil cups, packed 35 to a 1 lb. box. Each cake is covered with a chocolate candy-like blend and topped with chopped pistachios, whole pecans, chopped walnuts or whole cherries.

Rum Patties, about 2½ in. square, are packed in paper cups—12 to the 1-lb. carton of silver and green design. The blend for these is chocolate liquor, nuts, fruits, eggs, sugar, rum and brandy, flour, salt, artificial flavors, macaroon paste, soda, shortening and water. They are preserved with benzoic acid and derivatives.

A Date and Nut Loaf is offered in an aluminum foil box and airtight self-sealing aluminum foil liner.

The green and red Hanscom label seals the flap closing. The 14-oz. loaf may be used as bread or cake.

One feature of the New England-style Plum Pudding is the Dutch crock in which it was baked. The pudding is ready to serve and comes with recipe suggestions for five different sauces.

The "Rum Jug" is used as the insignia for Hanscom's Rum and Brandy Fruit Cakes, packaged in three sizes.

Each cake is individually registered and bears its own handwritten serial number. The 1-lb. wooden treasure chest of fruit cake has a sliding top and is securely bound with two wires. The 1-lb. ¾-oz. size is in a mailing carton and the 2-lb. deluxe gift tin also has an outer protection for mailing purposes.

Tinned Poultry Products

KING HENRY VIII is famous for his appetite and now his name becomes the appropriate label of a new crop of canned poultry products.

The ravenous Henry, munching a drumstick, is pictured in full-color on the face of a 404x700 tin, holding a whole roast chicken with gravy.

The 2-lb. delicacy may be warmed or used as is for a cold snack. Butter, onions, salt, garlic and seasoning are the only additions to the chicken and its natural juices.

Disjointed Roast Turkey and Giblet Dressing is offered by the same company. Here, large sections of roast turkey—both white and dark meat—are canned with a dressing made of bread, giblets, onions, turkey broth, tomatoes, celery, salt, butter and spices. This product, too, may be served hot or cold. Net weight is 2 lb.

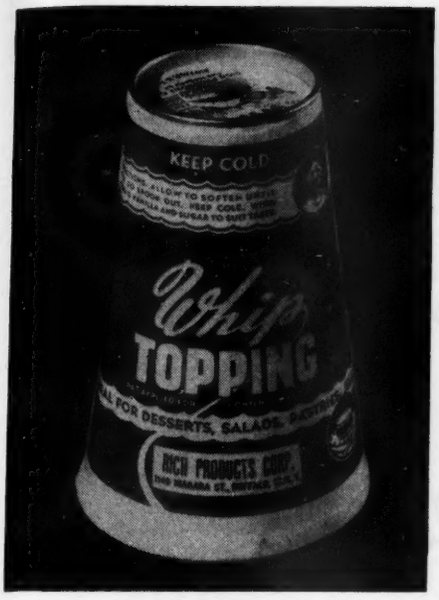
A third recent offering of C. V. R. Food Products Corp., Long Island City, N. Y., is Home Style Disjointed Chicken and Chicken Noodle Soup.

This item is novel and practical in that the soup may be served separately and the chicken used in any desired manner. Each will make three or four portions. Noodles, carrots, onions, celery, garlic, salt and spices are added, net weight being 2 lb. 14 oz.

Each product has been inspected for wholesomeness by the U. S. Department of Agriculture.

More Soy Bean News

SOY cream made from soy protein, soy fat, carbohydrates and flavoring is being distributed in 15 eastern and midwestern states as well as Texas, New Mexico, Arizona and



California by Rich Products Corp., Buffalo, N. Y. It is refrigerated.

The manufacturer says that Whip Topping triples its bulk when whipped and will stand up somewhat longer than heavy cream. It can be rewhipped and if only half is used, the rest may be kept in a freezing compartment without harmful effect.

The topping is packaged in a ½ pint sealcone container manufactured by the Sealright Co., Fulton, N.Y.

Canned Spuds

CUT-TATOES is the trade name selected by the State of Maine for its recently developed canned potatoes.

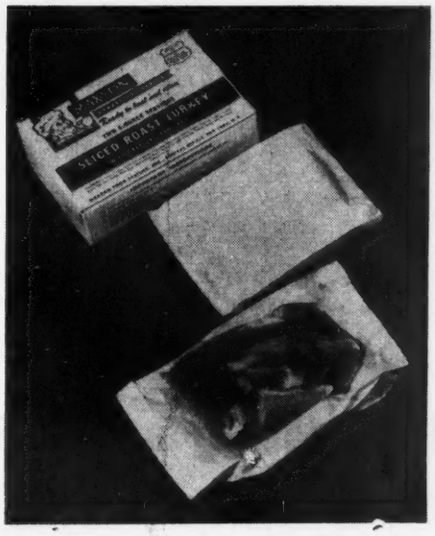
U. S. No. 1 Grade raw potatoes are prepared by a steam process rather than by lye peeling, and are produced in diced, French fry and sliced shapes. They are cooked slightly, enough heat being used to hold color and protect quality.

The diced shapes are suitable for potato salad, chowders and stews. The French fries may be used in the usual way or baked. The slices are always good for lyonnaise or scalloped potatoes.

The first canner licensed to pack State of Maine Cut-Tatoes is H. C. Baxter and Bro., Brunswick, Me. The company uses the red, white and blue State of Maine color label with a black and white photographic strip of the cut potatoes bearing the pertinent facts as to contents, name of company and information about preparation.

Packed in a light brine, the No. 2 can weighs 1 lb. 4 oz. and serves four.

Licenses to pack Cut-Tatoes will be issued to other Maine canners during this year's potato season.



Turkey for Two

SLICED ROAST TURKEY with dressing and gravy is the second of a series of precooked frozen foods being introduced to the retail trade by Maxson Food Systems, Inc., New York.

Each box contains two 6-oz. servings, packaged in individual paper bags. The wax-coated carton carries the standard red, white and blue Maxson label — easily readable — with wax paper overwrap.

Besides turkey and turkey stock, ingredients include water, bread, vegetable shortening, onions, turkey gizzards and livers, celery, salt, corn starch, flour, eggs, beef extract, sugar, garlic, caramel coloring, parsley, spices and flavoring.

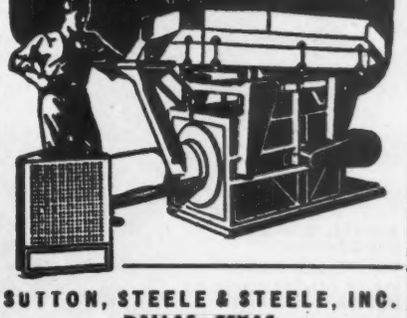
Instructions are to place frozen portions in a shallow tin with loose fitting lid and heat in oven for 25 minutes at 400 deg. F.

The product is inspected by the U. S. Department of Agriculture.

Stray Bronze

• Yes! And that piece of stray metal should not be found in your finished product! To eliminate this headache of the cereal and other dry food processors, we have developed a new type stoner better than 99% efficient! Revolutionary in design, it removes stones, glass, NON-MAGNETIC as well as magnetic metal, and other hard, dangerous contaminations from wheat, cereals, beans, and other dry food products with amazing ease. Compactly built, requires little floor space. CAPACITY UP TO 16 TONS PER HOUR! Operation cost as low as 3/5 of 1 H.P. per ton hour! Write for Bulletin FI-846.

SS&S
AIR-FLOAT
STONER

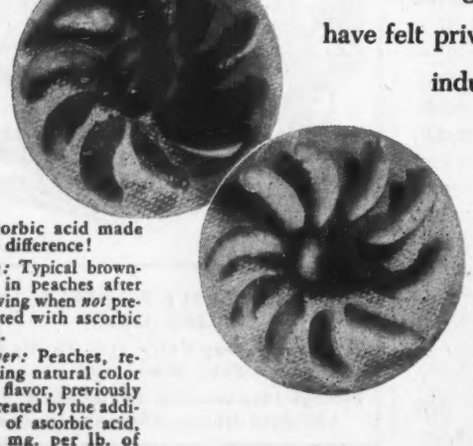


SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
In Canada—Kipp Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign—Separations Engineering, Ltd. 133 Bush House, Aldwych, London

Frozen peaches retain both—thanks to 'ROCHE' ASCORBIC ACID...

here's how... Frozen peaches and apricots are infinitely more appealing if you can prevent those two bugaboos—*browning* and *loss of flavor* upon thawing. ✲ 'Roche' Ascorbic Acid (vitamin C) is the easy answer to this problem. Use it in your prefreezing treatment of this year's pack. Consumer acceptance is insured, for your peaches and apricots will grace your customers' tables as fresh looking, as tasty, and as tempting as the day they were picked. ✲ Efficacy of vitamin C has been dramatically demonstrated in several years' commercial packs. State agricultural experiment stations recommend its use. We of Roche Park have felt privileged to supply vitamin C "by the tons" to the frozen fruit industry and to have our technical experts in your plants.

(Unretouched Photograph)



Ascorbic acid made this difference!
Top: Typical browning in peaches after thawing when *not* pretreated with ascorbic acid.
Lower: Peaches, retaining natural color and flavor, previously pretreated by the addition of ascorbic acid, 150 mg. per lb. of finished pack.

For complete information, including new outline on application of ascorbic acid to other fruits, write to:

'ROCHE' Vitamin Division

HOFFMANN-LA ROCHE, INC., NUTLEY 10, N. J.

FOOD INDUSTRY NEWS

GENERAL

Cuban Sugar Agreement Viewed As Step in Long Term Program

The thirty-year history of U. S. sugar imports would indicate that our chief supplier ought to be protected

FINAL agreement on a basic U. S. price of 3.675 cents per pound for the 1946 and 1947 Cuban sugar crops, with "escalator" clauses tied to the cost of living index, freight rates and changes in import duties, brings to a close the first phase in this country's postwar sugar program. From there on, however, the program ceases to be simply a matter of setting a fair price. It becomes a minor national issue, subject to both economical and political considerations. Stripped of its complicated factors, the outcome will decide whether the U. S. will offer, in peacetime, some measure of economic protection to its big wartime sugar supplier, or whether history is to be repeated.

When the U. S. entered World War I, in 1917, Cuba was supplying about 41 percent of our sugar requirements, U. S. insular possessions, about 30 and domestic producers about 28 percent. Only Cuba was able to step up much needed production during 1918 and 1919. In fact, all except domestic beet fell off drastically, and the beet increase was less than 100,000 lb. Thus, by the end of 1919, Cuba was supplying about 51 percent of our sugar needs. Their producers had naturally extended all production facilities, with attendant heavy investments, to accomplish this increase.

With these greater facilities on their hands, the tariff act of 1921, upped the duty on sugar from 1 cent to 1.61 cents per pound. In 1922, the duty went up to 1.76 cents per pound and in 1930, to the all time high of 2 cents. The result was to stimulate production in the duty free Philippines, Hawaii and Puerto Rico to a point where sugar became a glut on the market. In May, 1932, a cargo from the Philippines sold in the New York market at $2.57 per 100 pounds. At this rate the Cuban producer would have received 57 cents per 100 pounds after deducting what amounted to an 80 percent duty. During this time imports of Cuban sugar were dropping steadily, from 57 percent of our total consumption in 1922, to 25 percent in 1933. This was the situation when the world wide depression brought economic collapse and finally revolution to Cuba in the early 1930s.

Some order was brought to the general sugar picture by the Sugar Act of 1934, which established quotas for the major U. S. suppliers. In Cuba's case, however, the quotas only served to restrict production, since that country's share was only 28.6 percent, where it remained until quota restrictions were set aside at the beginning of World War II. Once again Cuba was the only supplier able to rise to an all-out wartime demand, its contribution rising to approximately 50 percent of the U. S. supplies for the years 1939 to 1945.

SUGAR AGREEMENT

After a series of conferences, covering several months, the U. S. and Cuba reached an agreement that assures this country of the greater portion of Cuba's 1946 and 1947 sugar crops on a price arrangement that ties in with fluctuating production costs. Secretary Anderson is seen here signing one of the preliminary agreements in Havana, on July 12, while Cuba's President, Ramon Grau San Martin (left) and Jose M. Casanova, president, National Sugar Mill Owners Association, sit in on the ceremony.

Those advocating strong support of the Cuban producers point to the dependability of their supply in time of crisis, as compared with the drop in production among all other producers during the two world wars. They further point to the exports to Cuba, which rise and fall with that country's sugar exports to the U. S. The problem is to provide this support without disrupting the producers in this country and in our island possessions. This is where economics, and inevitably politics, enter the picture.

Appoint Canadian to Head FAO Fisheries

THE APPOINTMENT of Dr. D. B. Finn, of Canada, as director of the fisheries division of FAO, was announced recently by Sir John Boyd Orr, director-general. Dr. Finn will resign the post of deputy minister of Canada's Department of Fisheries, which he has held since 1940, to accept the new position.

As head of the fisheries division, Dr. Finn will undertake the pioneering task of building up and operating the first intergovernmental fisheries organization with such a wide scope in functions and membership. Forty-two nations are now members of FAO. The fisheries division will be concerned with both the consumption and production of fish on a world scale. Its aim will be to expand markets, improve the economic condition of producers, and serve the industry in a technical advisory capacity.

The first undertaking will be to survey world production and consumption as the basis for recommendations to be made at the next FAO conference, which will be held in Copenhagen, September 2.

Scholarships Awarded To Carnation Families

SCHOLARSHIPS in honor of the late Elbridge A. Stuart, for many years a leading figure in the food processing industry and the founder and first president of Carnation Co., Milwaukee, Wis., have been awarded to three daughters and two sons of Carnation Co. employees for the 1946-47 college term.

Valued at $500 each, the scholarships represent a new phase, of the "employee relations" program and was recently inaugurated by the Car-

Press Association

OPEN AIR STORAGE

This is the beginning of a pile that was expected to cover a square city block and reach a height of 25 ft. Chances of serious loss from this practice are small and the custom is probably as old as wheat itself.

nation Co. to fulfill the wish of Mr. Stuart that the benefits of higher education be provided to deserving young people regardless of financial status. A trust fund of $300,000 has been established for this purpose, and it is planned that the number of scholarships awarded each year will eventually be increased to 30.

Open Wheat Storage Need Cause No Alarm

NEWSPAPERS throughout the country made much of the ground piling of wheat during the past month and in most cases expressed alarm at the potential loss the practice might accrue to the 1946 hard winter wheat crop.

Actually there is nothing new about piling freshly threshed wheat on the ground, though it may be somewhat more extensive this year because of the shortage of rail grain cars. Gondola cars, which have been used in past bumper crop years, are tied up with the hauling of coal, an aftermath of the recent coal strike, while wrecked and worn-out box cars have not been replaced, as yet.

Reports are that the railroads have only 700,000 box cars and that loadings of wheat in Kansas alone are running as high as 300,000 cars per week. This shortage is intensified by the harvest and threshing coming two weeks earlier than had been expected. Heavy loading of cars in the Pacific Northwest and the hard spring wheat areas for movement to export shipping points prevented the railroads from concentrating cars in the hard winter wheat area. Another factor is the unexpected yield, particularly in Texas, Oklahoma and Kansas. In Kansas, estimates have jumped from 165,000,000 bu. on May 1, to mid-July estimate of 207,000,000 bu.

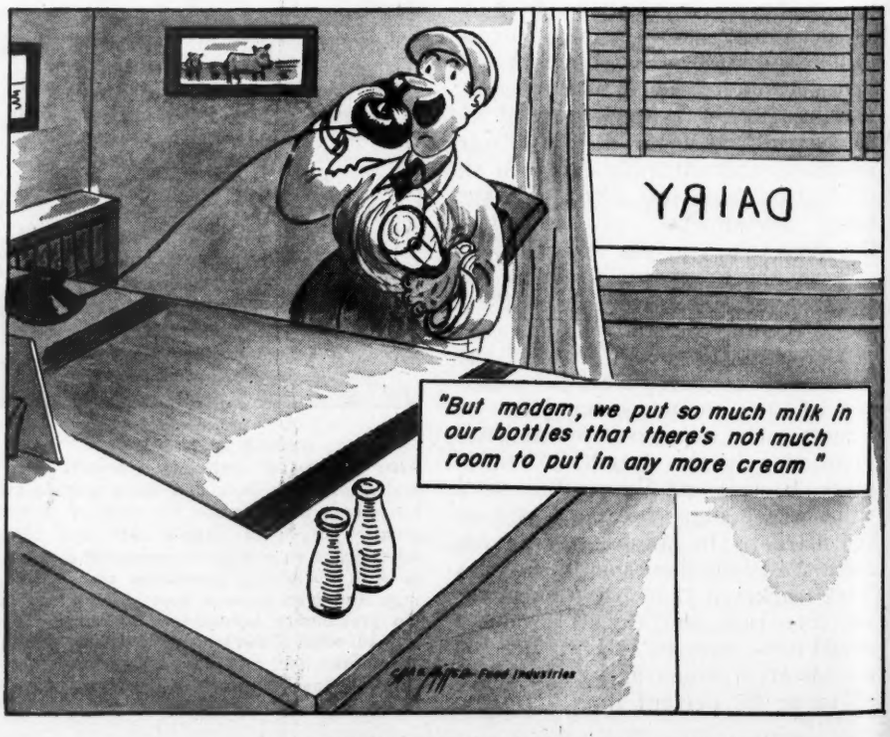
Statements that wheat stored on the ground will cause losses up to 15 percent may be discounted. Such a heavy loss would only be incurred if the wheat had to be held on the ground up into late winter and early spring. Under normal outdor storage conditions, the total loss should not exceed 2 percent. When wheat is stored on dry ground, the loss is confined largely to that which sprouts along the edges of the pile and that which may be bleached out by rain and sun on the surface. Surprisingly little water penetrates properly piled wheat.

Reveal Added Plans On QMC Officer School

FURTHER developments were revealed last month in the educational program being undertaken by the Quartermaster Corps to provide qualified officer personnel for research and development work on food products and containers suitable for military use. The trainees will eventually take the place of civilian specialists who served, either as officers or civilian employees in the subsistence laboratory during the war and who have since returned to industry. It is a part of a broad training program that is being made public piecemeal many parts of which will have a direct bearing on the subsistence problems of the armed forces. The reorganization of the army bakers and cooks schools under the control of the Quartermaster Corps, which was recently announced by the War Department, is a part of the general scheme.

Four leading technical schools, Chicago and Northwestern Universities, Illinois Institute of Technology and the University of Iowa, have agreed to cooperate with the program to train Quartermaster officers. They were chosen both for their high standing and their proximity to the Quartermaster Food and Container Institute for the Armed Forces at Chicago.

Maj. Gen. T. B. Larkin, The Quartermaster General, in explaining the new educational program acknowledges the notable advances made in scientific feeding of troops during



SHOULD THE RIGHT ADHESIVE BE?

RELY on National . . . with its interest in your individual requirements . . . for an adhesive that will be flexible enough to meet all plant and field variations.

Let's look at some individual requirements. A hard luggage adhesive should be easily handled and versatile. It should adhere vulcanized fiber to plywood . . . 'draw on' leather to wood, fabric, paperboard, etc., . . . bond wood molding inside sample cases . . . laminate multiple plies of veneer before shaping under heat and pressure . . . and offer exceptional resistance to weather and fungus. A soft luggage adhesive should leave bonded leathers and treated fabrics with an outstanding softness and pliability.

An upholstering adhesive should provide adequate tack and speed for hand adhering cloth to cloth, chipboard, wood, wadding, etc. It should be free from residual odor and any tendency to penetrate and stain light fabrics.

A labeling and overcoating adhesive should bond to wood, fiber, painted steel, tin and glass. It should be weather-proof, vermin-proof, age-proof.

It doesn't matter whether your adhesive problem is a run-of-the-mill packaging, converting, assembling job or a brand new postwar problem. National is interested in creating an adhesive formula that will meet your individual requirements . . . provide sufficient flexibility for material and commercial variations . . . withstand all extremes of shipping and consumer uses. Your inquiry is invited — NOW!

Dunellen Plant

• Offices: 270 Madison Avenue, New York 16; 3641 So. Washtenaw Avenue, Chicago 32; 735 Battery Street, San Francisco 11, and other principal cities. In Canada: Meredith, Simmons & Co., Ltd., Toronto. In England: National Adhesives, Ltd., Slough.

National ADHESIVES

EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE

Press Association

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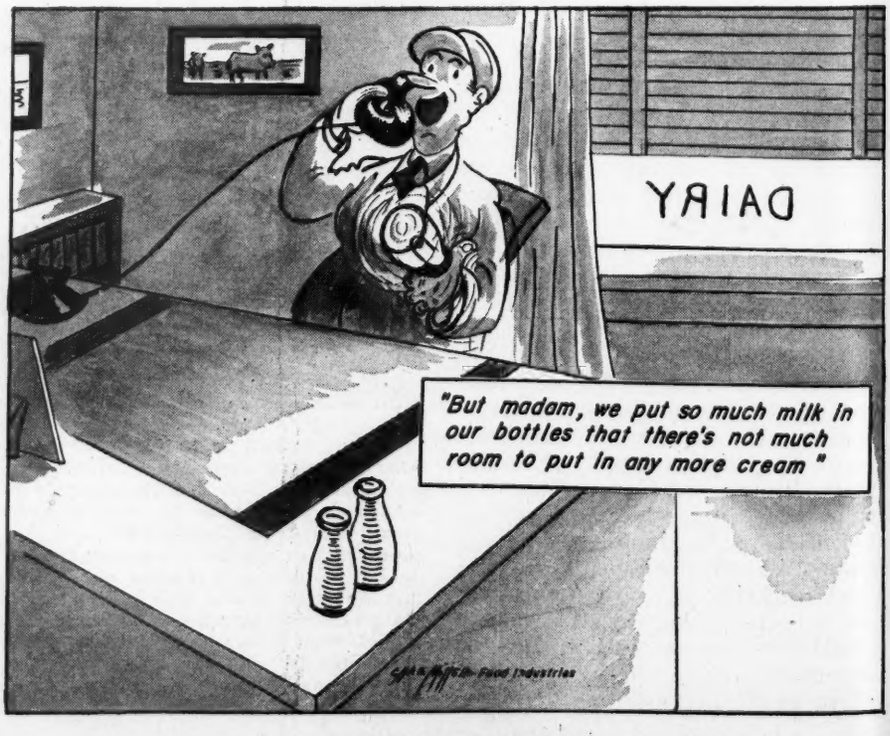

HOW *Flexible...* SHOULD THE RIGHT ADHESIVE BE?

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National ADHESIVES

Dunellen Plant

EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE

George Coble Increases Dairy Business from 11 to 36,000 Daily Gallons in 11½ Years — Uses 46 Frick Refrigerating Machines, Totaling Over 2,000 Horsepower

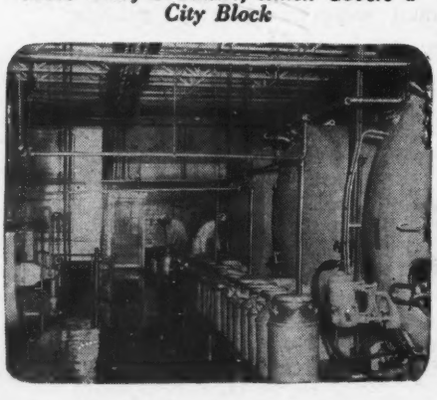
That summarizes the remarkable growth of Coble Dairy Products, Inc., of Lexington, N. C., which now has 15 branch plants.

Starting with one small Frick compressor in 1934, Mr. Coble now uses Frick Refrigeration in all his dairies—will own 51 Frick machines when those on order are shipped. Installation by Piedmont Engineering Corp., Frick Distributors at Charlotte, N. C.

Another proof of the saying that "The users of Frick Refrigerating, Ice-making and Air Conditioning Equipment make money."

FRICK CO.
DEPENDABLE REFRIGERATION SINCE 1882
WAYNESBORO, PENNA. U.S.A.

View in the Lexington, N. C., Plant of Coble Dairy Products, which Covers a City Block



the last war but emphasizes the future possibilities in this vital field of investigation which demands constant and unremitting research if pace is to be kept with scientific developments in the United States and abroad.

"The results of this program," General Larkin said, "will be the integration of army food problems with graduate civilian education and research; the rotation through the subsistence laboratory of research personnel at the productive stage of their careers; and the building of a nucleus in the Reserve Corps and in industry of personnel trained in the military characteristics required in food development.

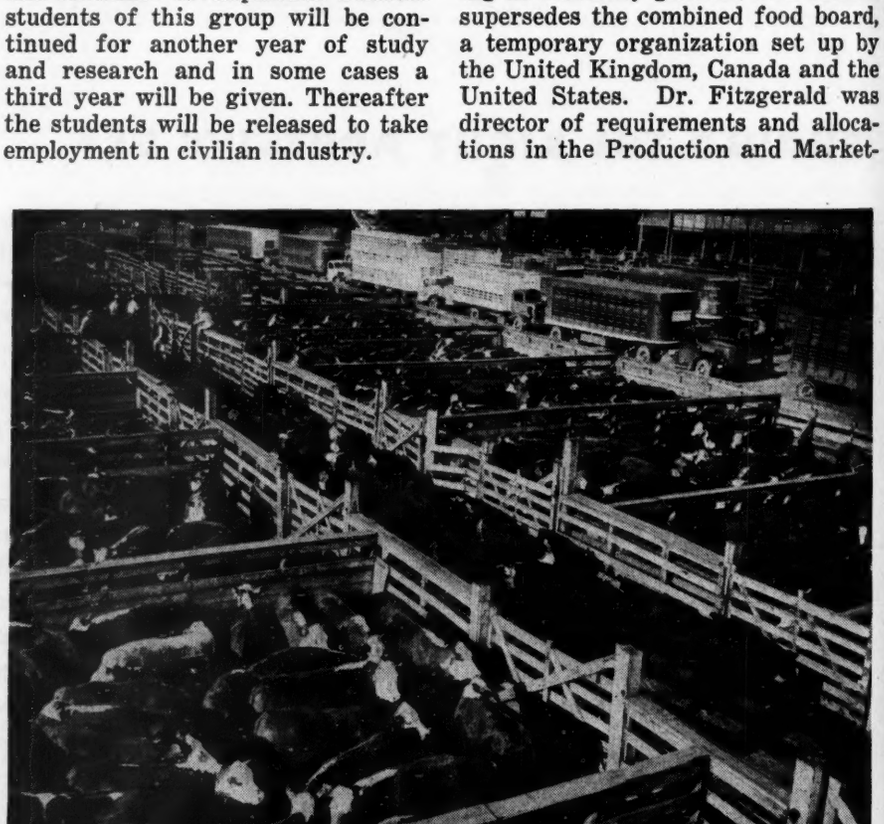
"The educational program, known as the Chicago Plan, will cover three years," he said. "During the first five months of the initial program, which will cover 17 months, the students will attend the subsistence school conducted by the Food and Container Institute to establish the framework into which their research will be fitted. Then a year of graduate study will follow with half time spent in the laboratory researching on special projects assigned in connection with Quartermaster food and container developments. Selected students of this group will be continued for another year of study and research and in some cases a third year will be given. Thereafter the students will be released to take employment in civilian industry.

"The graduate students, who were selected because of outstanding scholastic records in the field of pertinent sciences, will be commissioned Second Lieutenants, reserve, in the Quartermaster Corps. Reserve Corps officers, selected to take the course because of high qualifications, will continue in grade.

"The Army will bear the expenses of tuition, texts, and laboratory fees and the student officers will receive regular army pay during the tour of duty. The work will consist of special sequence courses in bacteriology, nutrition, chemistry, bio-chemistry, physics, electrical and chemical engineering, zoology, paper chemistry, psychology, biology and statistical analysis."

FAO Sets Up Council On Emergency Foods

THE most important recommendation of the May meeting of the Food and Agricultural Organization of the United Nations (see FOOD INDUSTRIES, July, page 115) has been carried out by the formation of the International Emergency Food Council, with Dennis A. Fitzgerald serving as secretary-general. The council supersedes the combined food board, a temporary organization set up by the United Kingdom, Canada and the United States. Dr. Fitzgerald was director of requirements and allocations in the Production and Market-



Associated Press

MEAT MOVES AGAIN

The immediate reaction to OPA's suspension offered quite a contrast to the Chicago photographers, who had been trying to make something of the empty pens at the stockyards, during May. This picture was taken when cattle receipts were up 45 percent from previous week.

ing Administration, USDA, in which the secretariat of the combined food board was established. Because of this association, Dr. Fitzgerald is very much at home with international food problems.

Life of the council is to continue "for the duration of the shortage of basic foodstuffs." FAO also determined that its life should extend to Dec. 31, 1947, unless an easing of the supply situation or UNO developments permitted termination of the council's work before that date.

"Trail Blazers" Again Features Chem. Show

NEW DISCOVERIES and developments in industrial chemistry will be epitomized in "The Chemical Trail Blazers" exhibit, which will be a feature display at the Fourth National Chemical Exposition to be held September 10 to 14, at the Coliseum, Chicago.

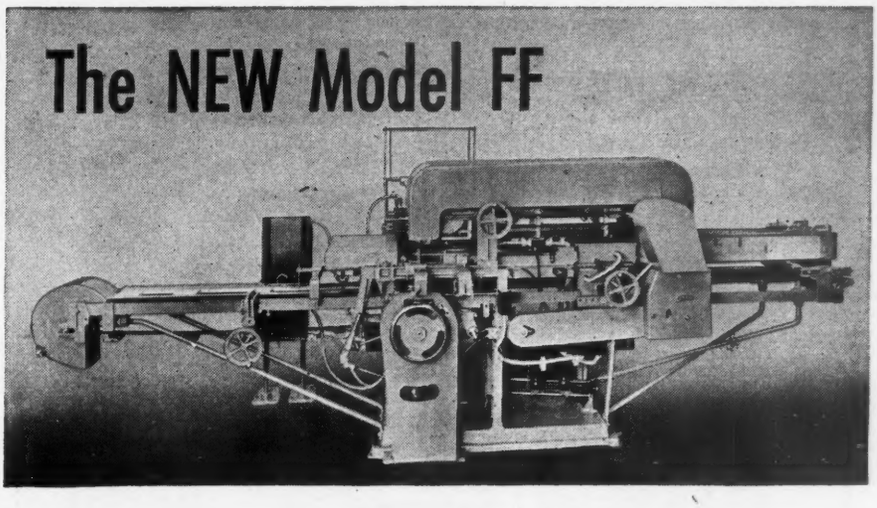
The exhibit will be a major development of a comparatively small collection of sketches, panels and specimens shown under the same title at the last National Chemical Show in the same building in 1944. It will be presented on a more elaborate, more comprehensive and broader scale this year.

The display is designed to be of interest to chemists and others attending the national convention of the American Chemical Society, to be held simultaneously, and with which the chemical show is closely integrated this year. As heretofore the exposition is sponsored by the Chicago Section of the ACS.

AMA Elects New Head Of Packaging Section

ELECTION of E. A. Throckmorton, president of Container Testing Laboratories, Chicago, as vice-president of the American Management Association was announced recently by Alvin E. Dodd, AMA President.

Mr. Throckmorton will be in charge of the packaging division of the Association and will supervise the packaging meetings, research and publications of the AMA and its annual packaging expositon, the nation's largest trade show for the packaging shipping and package machinery industries. He was formerly vice-president in charge of sales research for the Container Corporation of America, Chicago, Illinois; general manager of the Match Import Company, New York, and assistant to the president of the Sefton Manufacturing Corporation.



Especially designed for wrapping FROZEN FOODS

In seeking faster, better wrapping, frozen food packers have been installing our well known FA model in ever-increasing numbers. But we were not content to let well enough alone. So our field men and engineers, working in close cooperation with the packers, developed numerous improvements especially designed to meet the requirements of the frozen food field. The result is the new Model FF.

This new model incorporates all of the outstanding features of the FA, such as quick hand-wheel adjustment, simplicity of changing from one size of package to another, variable speed drive, self-clearing, etc., and has a speed of 40 to 100 packages per minute. In addition, it offers the following

NEW ADVANTAGES

Infeed conveyor and discharge belt are supported from the base of the machine, making it easier to transport it from one location to another.

Discharge belt has been reduced to 3 ft. in length. This is made possible by a new design of overhead transport which allows discharge belts to run slower and affords the same amount of cooling time as with the 7-ft. discharge.

Rust-proof parts are used wherever necessary and infeed conveyor rails are of stainless steel.

Infeed conveyor is made of a series of vertical bars, forming a grill through which any spilled produce falls instead of being carried into the machine.

The elevator well slide is provided with a special oiling system through which soapy water can be forced for cleaning the slide. A separate fitting is furnished for oiling.

To overcome variations in size of packages due to freezing, the elevator well is now spring-mounted and will allow up to 3/8" variation in width.

To make it easy to switch from one design of printed wrapper to another, the electric eye scanning head has been made to register from any point across the entire web of the paper roll.

A new type of overhead transport chain makes the machine self-clearing. Its drive has a special solenoid knock-out device which disengages under pressure, thereby preventing jams.

Double clutch handle levers can be provided so that the machine can be operated from either side of the conveyor.

Special guards are provided. Guard for overhead chain is hinged at back and spring-mounted at front, making it unnecessary to remove it when cleaning.

Write for further information

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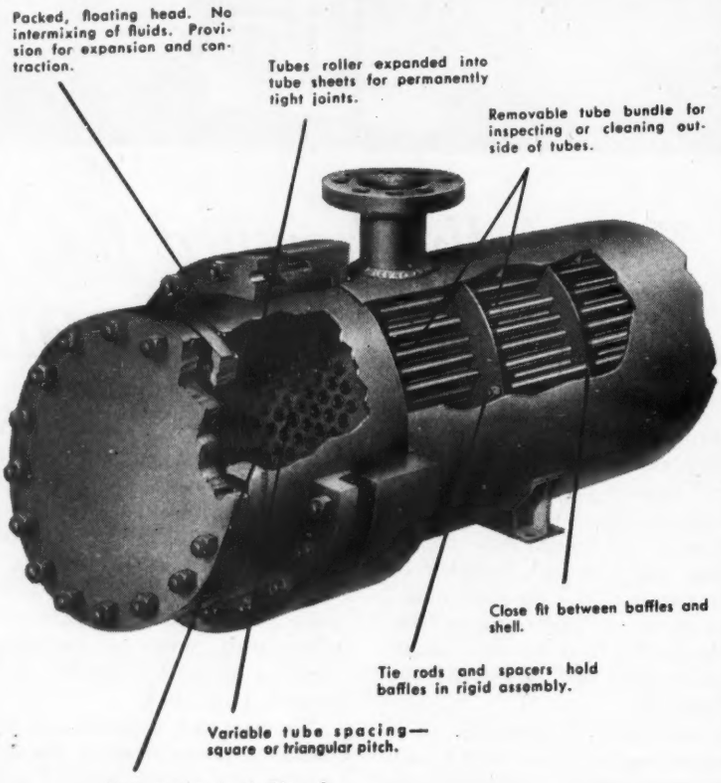
Over a Quarter Billion Packages per day are wrapped on our Machines

Designed and constructed to cope with

DIVERSIFIED TEMPERATURES, PRESSURES AND CORROSION PROBLEMS

in the food industries


Packed, floating head. No intermixing of fluids. Provision for expansion and contraction.
Tubes roller expanded into tube sheets for permanently tight joints.
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A broad range of food processing requirements CAN be and IS efficiently handled by the standardized line of Ross Heat Exchangers. To assure specified performance under your own operating conditions, there are five basic types in this line, each thermally designed for particular kinds of service.

Known as Series CHX, Ross Standard Heat Exchangers represent the finest in engineering, construction and materials, with full consideration to favorable initial investment, operating and maintenance costs. By reason of Ross standardization and mass production of individual heat exchanger parts, you benefit in both cost and improved quality.

Illustrated is one of these Ross standard types, featuring packed floating head, removable tube bundle, straight tubes and provision against intermixing of the two fluids circulated. For specific information on this design, as well as on the other standard types, consult a Ross Heat Exchange Engineer. He will gladly work with you to determine the unit best suited to your needs.

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PROCESSING

National Confectioners Discuss Sanitation

SANITATION in confectionery plants, with emphasis on ingredient materials, good housekeeping, and properly designed processing equipment highlighted the 63rd annual convention of the National Confectioners Association, in Chicago, June 24-27. Other sessions were devoted to predictions of available supplies of essential candy-making ingredients, new processing methods, cost and distribution, as well as training of salesmen and addition of new types of ingredients to candy. A record breaking registration of over 3,500 was in attendance at both the convention and confectionery industries exposition.

Frequent checks on all ingredient materials entering the plants, systematic cleaning of the molding starch, and use of air filters instead of screens on windows, as well as sealing of all cracks and crevices in the plant were considered necessary precautionary measures for good plant sanitation by John H. Jacobs, O. P. Baur Confectionery Co., Denver, Colo. He also stressed the importance of keeping equipment and material away from the walls and up off the floors, and instituting a sanitary training program.

Charles R. Adelson, Delson Candy Co., New York, said there was a more enlightened attitude toward easily cleaned equipment at present in the confectionery field. Until recently, confectionery manufacturers did not demand sanitary machines because they were not fully aware of their great importance. Continued cooperation between the candy manufacturers and machinery manufacturers is needed to insure the desired type of equipment.

Earl L. Wilson, President of the California & Hawaiian Sugar Corp., San Francisco, predicted that sugar rationing cannot be eliminated before early 1948. The prospects for 1947, however, look much better. Continental beet and cane production this fall will be from 200,000 to 240,000 tons. Available Caribbean production will be from 1,000,000 to 1,075,000 tons greater in 1947 than in 1946. By that time there should be a reduction in European takings because of its improved beet production. Also since two-thirds of the mills in Java are still intact and able to operate, the present planting of sugar there should be available within 18 months.

The Jeffrey Book of Experience Is Open To Your

MATERIAL HANDLING PROBLEMS

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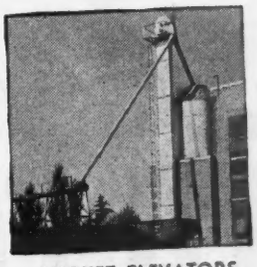
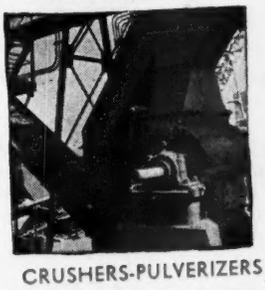
SCRAPER CONVEYORS


BUCKET ELEVATORS

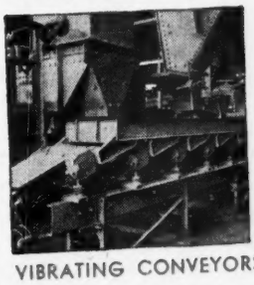
APRON CONVEYORS


CRUSHERS-PULVERIZERS

SPIRAL CONVEYORS

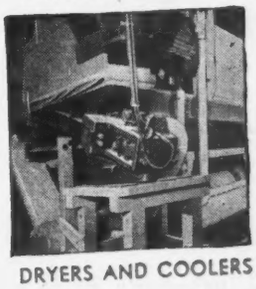
VIBRATING FEEDERS

WAYTROL FEEDERS


VIBRATING CONVEYORS

CHAINS

VIBRATING SCREENS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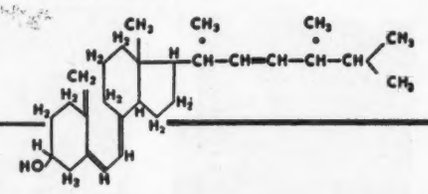

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*Standard Unit = 1,000,000 U.S.P. Units

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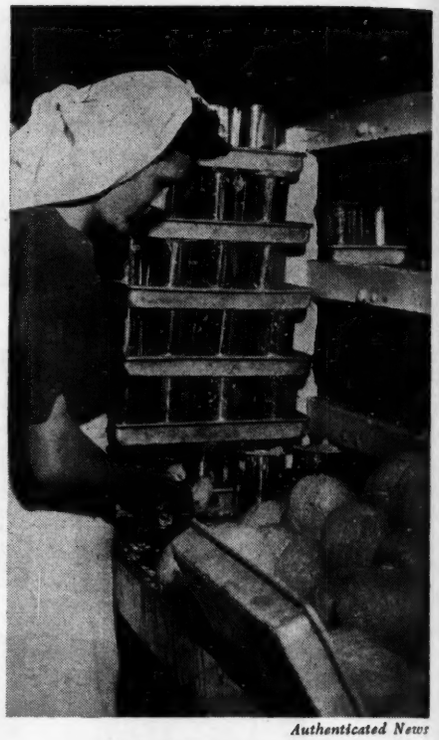


Authenticated News

FLORIDA GRAPEFRUIT

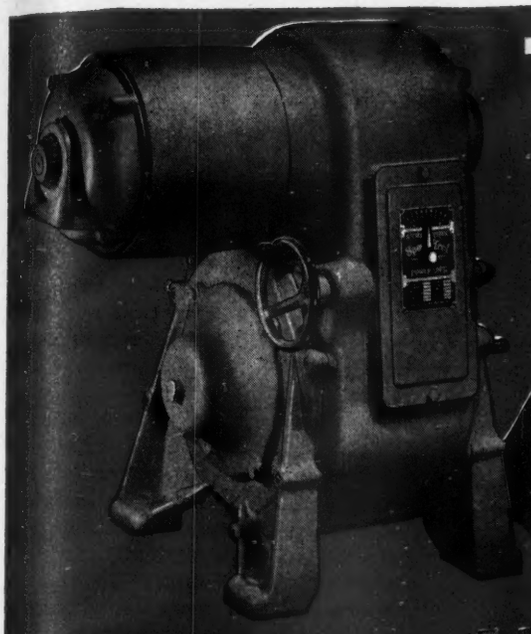
With one of the largest Florida crops on record to work with, the grapefruit canners had a busy season. This worker is shown "sectionizing" the fruit at a Bartow plant.

The corn supply situation is still critical. The recent release of 6,0000,000 bu. of corn to wet millers is expected to keep the industry operating until August 1. No one knows what will happen between August and October when the new crop will be coming in. To maintain the corn refining industry on a minimum of 80 percent basis after August 1 will require 30,000,000 bu.

The peanut industry demand has exceeded the supply in the last few years. The mills in Georgia have begun to crush "runner" peanut but in the Virginia-Carolina area the 1945 crop has already been sold and shipped and there is not much left in the hands of the farmers. A good 1946 crop will be available if the weather continues favorable.

During the past 25 years the trend in confectionery manufacturing has been toward simplification of processing technics and a more or less continuous flow of work in progress from one machine to the other according to James A. King, The Nulomoline Co., New York, N. Y. Comparatively few manufacturers, however, have succeeded in developing a 100 percent continuous process. The reason given is that certain types of candies do not lend themselves to continuous processing; some 5 to 10 different operations are required to make any one of a dozen or more types of candies. These operations include weighing,

Three Ways To Cut Production Costs –

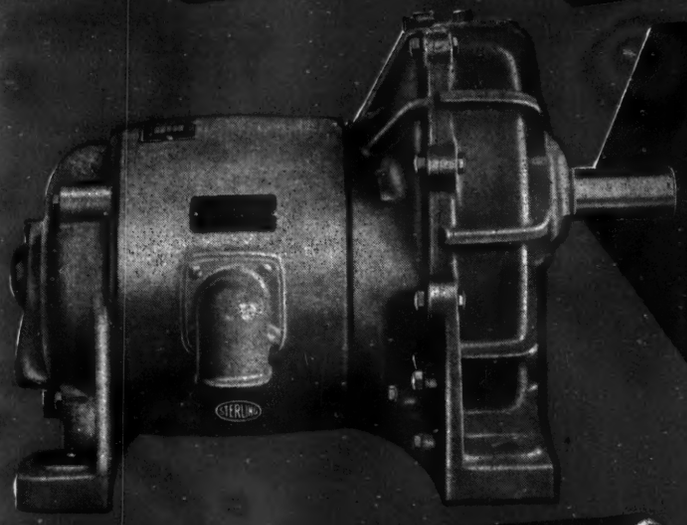


Variable Speed

Sterling Speed-Trol is a proven, self-contained, infinite variable speed power unit. With Speed-Trol you can get the exact speed for maximum production.

H.P.—From ½ to 15 Ratios—From 2:1 to 6:1

STERLING SPEED-TROL MOTOR

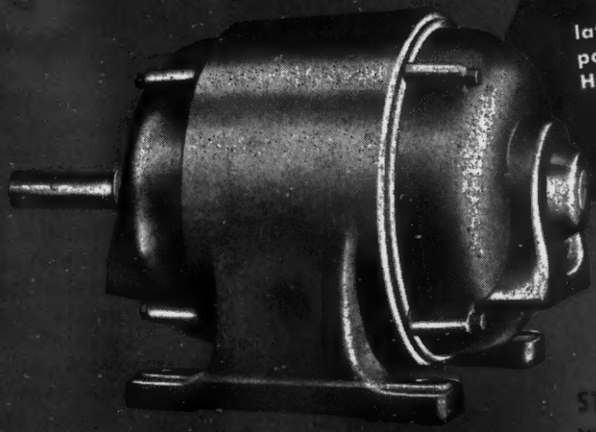


Slow Speed

Sterling Slo-Speed (Modern Gear System) Motors give you a complete power drive in one soundly engineered—compact—flexible—ultra efficient unit.

H.P.—From ½ to 15 Gear Ratios—From 3:1 to 50:1

STERLING SLO-SPEED MOTORS



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Sterling Standard Klosd Motors are the latest word in design, incorporating important improvements including patented Herringbone Rotors.

H.P.—From ½ to 15

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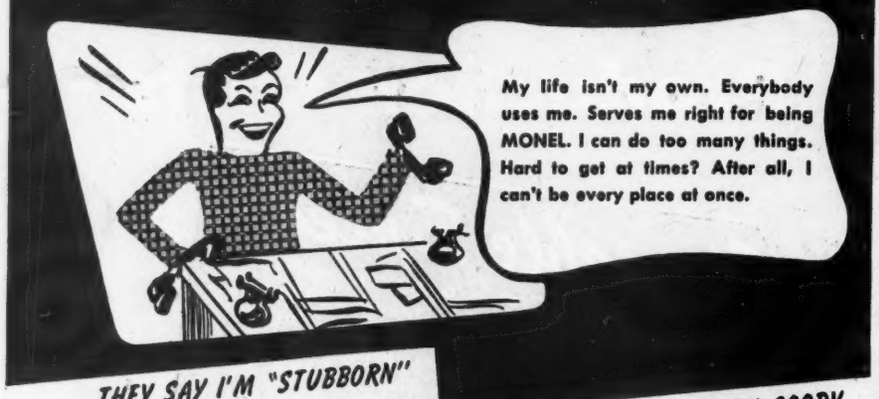
My life isn't my own. Everybody uses me. Serves me right for being MONEL. I can do too many things. Hard to get at times? After all, I can't be every place at once.

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I resist so many things — non-oxidizing acids, alkalies, salts, water, food products, organic substances, high temperatures. Rust? I'm immune to it. Abrasion? I seem to wear forever.

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where product purity, flavor and clarity are essential. But that's because I'm non-contaminating. Actually I'm tough, hard and extremely strong — much more than common brass or bronze.

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"Buffalo" Monel Wire Cloth is woven in a large range of meshes from very fine to coarse, in all standard weaves.

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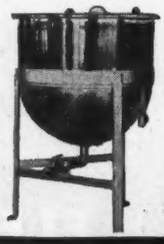


LEE METAL PRODUCTS COMPANY, INC.
408 Pine Street, Philipsburg, Pa.

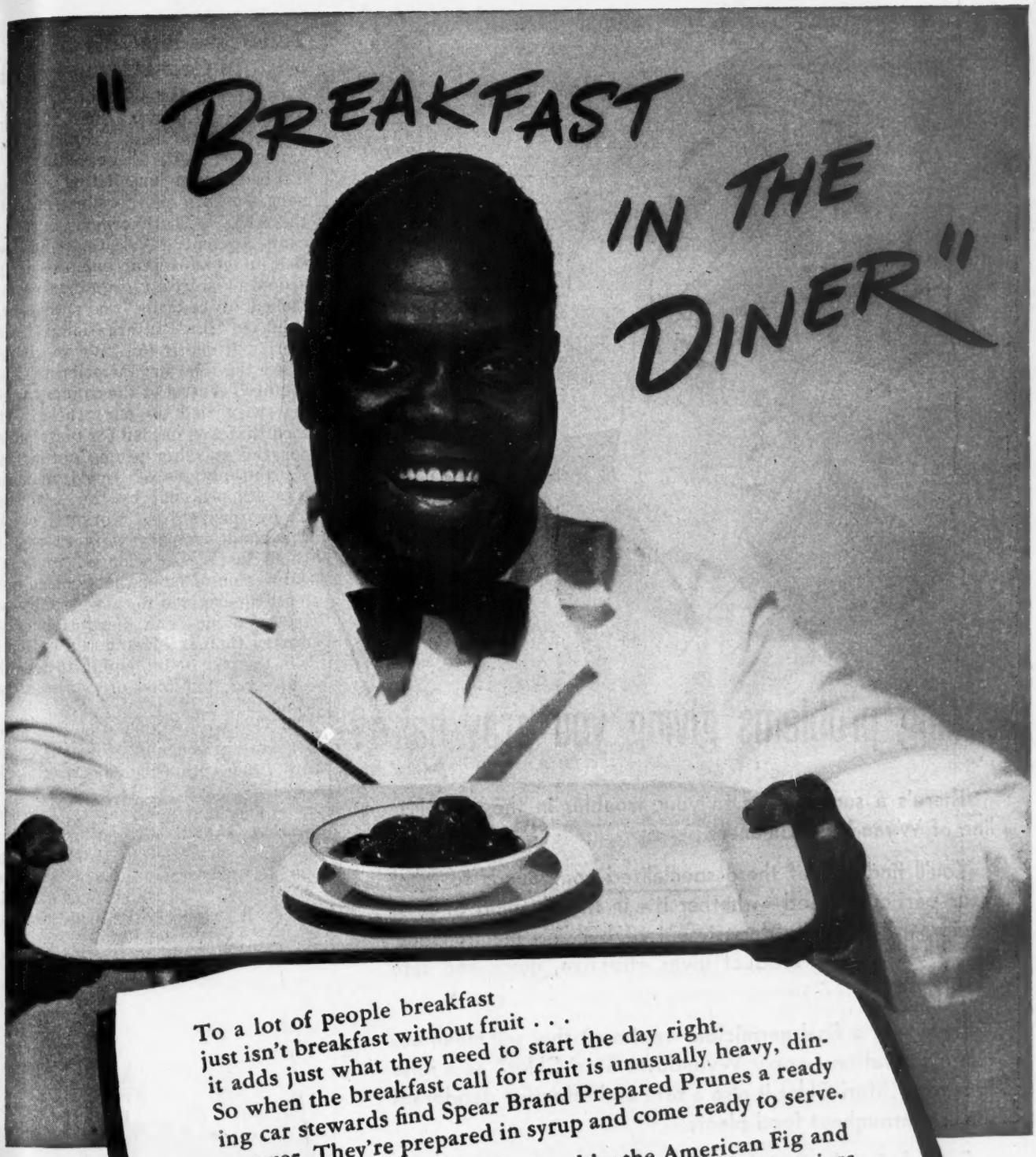
blending, tempering, mixing, cooking, beating, cooling, conditioning, drying, pulling, sizing, casting, cutting, forming, coating, wrapping and packing.

Those candies requiring a setting, conditioning or drying period do not lend themselves to continuous processing. Consequently, batch processing will continue in favor when making candies that normally contain from 15 to 20 percent moisture, principally marshmallow and starch jelly gums.

The research committee of the National Confectioners' Association, under the direction of Dr. H. H. Hall, Agricultural Chemical Research Division, Department of Agriculture, New Orleans, La., reported extensive studies on the incorporation of low-methoxyl pectin and isolated soya protein in candies. Through the use of low-methoxyl pectin, available sugar supplies can be extended to make more candy because less sugar is required to produce the desired sweetness. The isolated soya protein supplements the short supplies of gelatine and egg albumin in addition to imparting specific properties.

Effects of regional conferences between confectionery manufacturers and equipment designers and builders, sponsored by the Association during 1944 and 1945, were evidenced in the equipment exhibited in the exposition. Among these exhibits were seamless, drawn, selflocking tilting kettles made of corrosion-resisting metals; chocolate-cookers with removable and easily cleaned agitators, flow pan and pipe, chocolate distributer, chocolate pump and tempering unit, mesh wire belts and other working parts made of stainless steel; streamlined covers to keep cleaning difficulties to a minimum and sanitary mountings to aid in keeping surrounding areas clean; high production continuous cookers; water jacketed, continuous fondant and cream centers beaters, sanitary dairy-type constant flow pumps, automatic, easily cleaned feeders for bar wrappers to operate at continuous and uniform high speed; and high speed, easily cleaned and adjustable machines for wrapping multiple wafers or cakes into a single cellophane covered package.

Among new supply materials exhibited were highly refined soya protein derivatives with high-whipping properties, combination of soya protein and egg albumen, and flavors developed to offset wartime shortages of previously used materials.



To a lot of people breakfast just isn't breakfast without fruit . . . it adds just what they need to start the day right. So when the breakfast call for fruit is unusually heavy, dining car stewards find Spear Brand Prepared Prunes a ready answer. They're prepared in syrup and come ready to serve.

Spear Brand Prunes are marketed by the American Fig and Date Co. of New York, N. Y. and are packed in #10 jars with efficient Crown Screw Caps. Only Crown Screw Caps have the patented Deep Hook Thread which grips under the glass thread. Greater sealing pressure is obtained with any given amount of application force. Crown Cork & Seal Co., Baltimore 3, Md. *World's Largest Makers of Metal Closures.*

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Cleaning problems giving you gray hairs?

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You'll find one of these specialized compounds to meet your particular need—whether it's in the cleaning of food equipment or in the department of building maintenance. Every Wyandotte Product gives effective, quick and safe results.

Then—for a final germicidal treatment that will mean absolute sanitation—apply Wyandotte Steri-Chlor* as a rinse or spray. Steri-Chlor is also a safe and effective deodorant for use throughout food plants.

For help in selecting the Wyandotte Cleaner that will end your worries, call your Wyandotte Representative. He's always ready to put his training and experience—and the latest developments of Wyandotte research—at your service.

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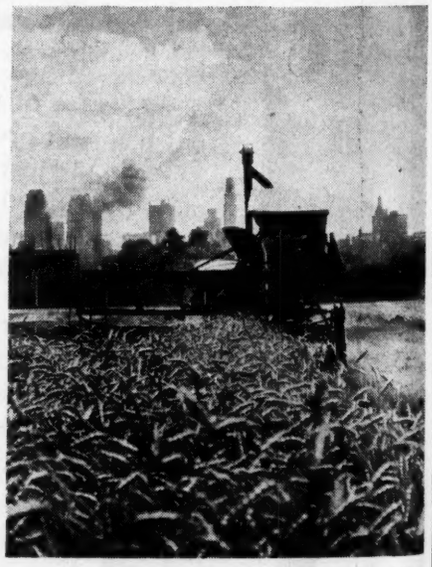
Teamsters Blast Rivals In Coast Cannery Fight

THE International Brotherhood of Teamsters through their magazine "The International Teamster" has announced to its membership that it has been given jurisdiction over cannery workers on the West coast by the AFL. "The enormous output of canneries on the West Coast has been tied up on more than one occasion by a dual or seceding organization controlled by radicals," says the statement in the "International Teamster." It continues, "We found that when the dual organization of labor acquired control of the cannery workers, they tied up our trucks. The food that was needed for distribution for the starving people abroad and for the millions of American homes was stopped, not by the Teamsters or by the railroad workers, but by the inside cannery workers who, in some instances, belonged to an organization of labor that seemed to be more determined to cause trouble and inconvenience and disruption of industry than in helping the nation to win the war or in helping to feed the suffering millions of Europe and Asia.

"We had to take over the inside workers in order to protect the drivers and properly distribute the foods."

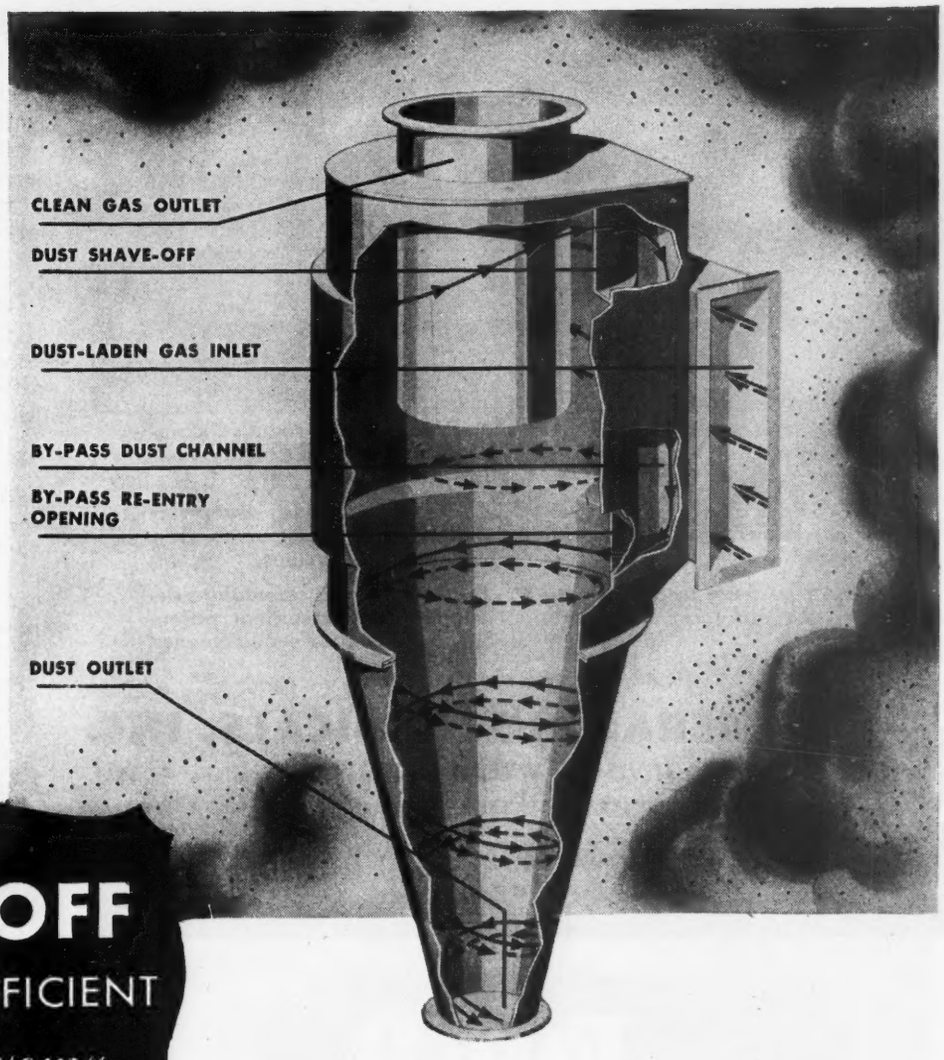
The organization of the cannery workers by an AFL. union will, it is claimed, protect the teamsters and inside workers from work stoppages resulting from jurisdictional disputes of rival labor organizations.



Press Association

MISSOURI WHEAT

City bred wheat looks just as good as any other in Kansas City, Mo., where this crop is being harvested right in the city's back yard. Grown along the Missouri river, the yield was 32 bu. to the acre, tested 14 percent moisture and weighed 62 lb. per bushel.



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Under the principles of dust collection established by van Tongeren, the patented "shave-off," found only in Buell Dust Recovery Systems, increases dust recovery by utilizing the double eddy current (present in all cyclone-type collectors) to establish *a highly efficient collection force.* (See pp. 5-9 in Buell's book: "The van Tongeren System of Industrial Dust Recovery.")

The "shave-off" thus enables Buell to achieve high recovery efficiency without resort to small-diameter cyclones —and Buell's large diameters permit construction of extra-thick steel, efficient operation with low centrifugal force fields, and consequent reduction of abrasive wear. These are major reasons why Buell Dust Recovery Systems in use three, four, five or more years have established outstanding records for trouble-free service and low maintenance cost.

Buell's book—"The van Tongeren System of Industrial Dust Recovery"—illustrates and explains the patented van Tongeren principle and its many applications to industry. We will be pleased to send you a copy without charge.

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5 Will gain favor for your products with housewives alert to nutritional values.

6 Available for immediate delivery in convenient potencies to meet your requirements.

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Ford

California Unions to Vote at Operation Peak

COLLECTIVE BARGAINING elections in Northern California canneries will be held "at the peak of the canning season" under procedure announced late in June by the regional NLRB.

The regional director was instructed by Washington headquarters to secure information from the California Processors & Growers, Inc., and independent plants to show which would be a representative week when a majority of workers would be employed. The NLRB will set dates on the basis of this information.

A CIO request that it appear on the ballots as the CIO Food, Tobacco & Agricultural Workers Union was approved by the board. It ordered that the AFL might be listed as the California State Council of Cannery Unions, AFL, thus blocking a CIO attempt to have it designated as the Teamsters' Union, AFL, the name of its parent union.

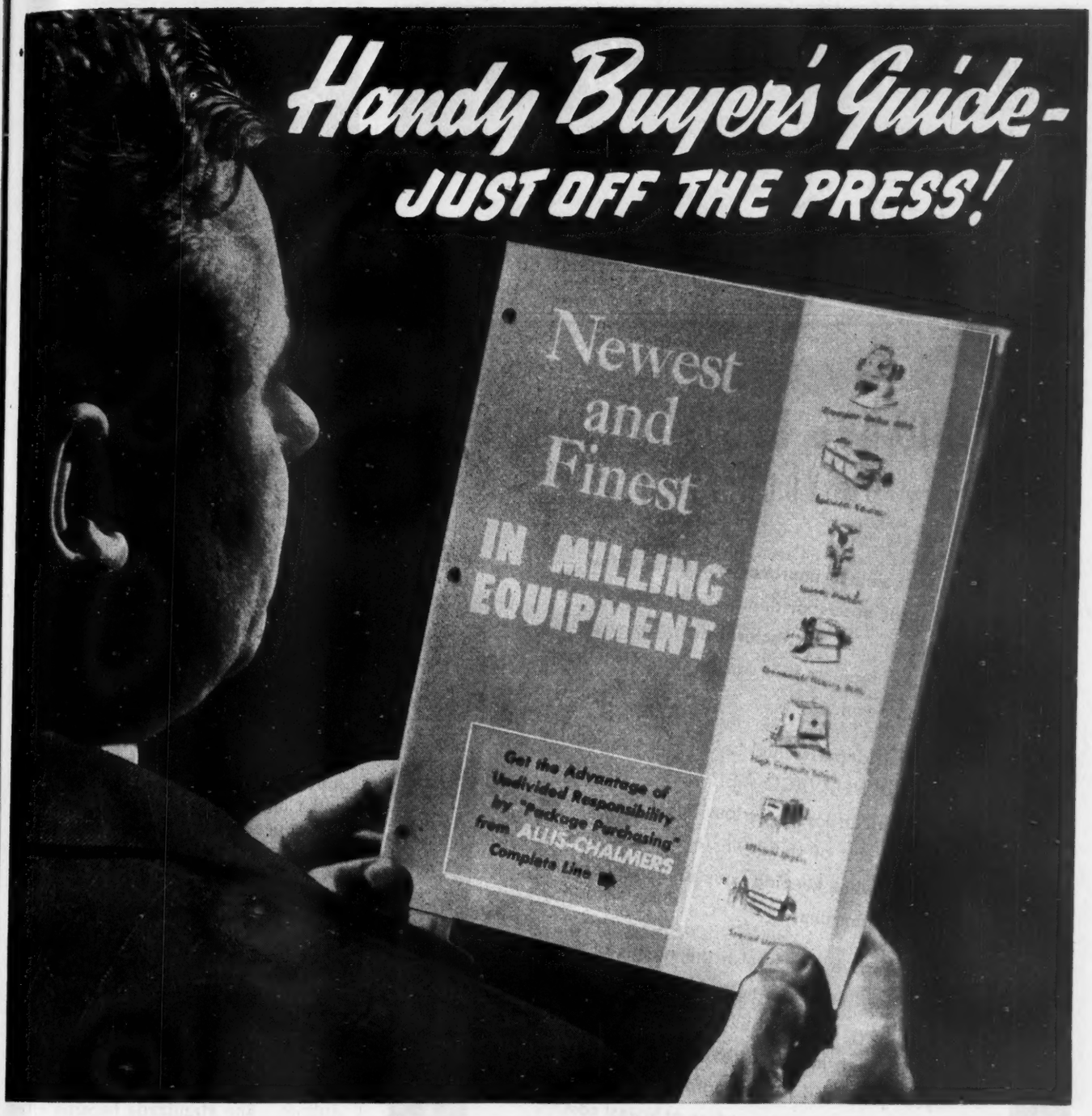
The NLRB ordered a new election after it voided a ballot last October when the FTA won a plurality over the AFL and independent unions. The election was protested by the AFL.

Cannery shutdowns followed an agreement by the employers to continue AFL closed shop contracts although the NLRB had ruled that neither union could have exclusive recognition pending the new election.

Flavorers Prepare for Fight on Alcohol Tax

THE FLAVORING Extract Manufacturers Association has agreed upon a member contribution of 2 cents a wine gallon on distilled spirits used in their manufacturing operations during 1945. The contributions will go to a special fund, which will be used to retain associate counsel, and the payment of railroad, hotel and other expenses incurred by members in holding conferences with various U. S. Treasury officials and members of Congress.

The object of these conferences will be the drafting of a proposed bond and permit system similar to that in force during the prohibition period. The association has considered the possibility that some members of the food and drug industry may not qualify under a bond and permit system. They feel, therefore, that it may be necessary to continue in force the drawback proviso, despite the complicated bookkeeping system that the proviso requires and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RELEASED by Allis-Chalmers, world's largest producer of flour mill equipment, this comprehensive 16 page bulletin graphically illustrates the entire A-C milling and processing equipment line. It offers concise, accurate information on sifters, roller mills, flaking mills, coolers, dryers and all types of auxiliary equipment for the industry. Free copies are available *now!* Call our nearby sales office or write direct for bulletin B6194A. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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INCLUDE PEST-CONTROL IN YOUR PLANS!

If you are going to improve your plant layout or expand facilities as soon as materials become available, give thought to structural arrangements and construction features that can do wonders to keep infestation down.

With proper departmental layout plus a scheduled program of WESTVACO METHYL BROMIDE fumigation, you can lessen serious infestation . . . decrease the cost of shutdowns and the ravages of food pests while keeping your sanitation expenditures at a minimum.

On request we can furnish the names of nearby experienced industrial pest-control experts to advise without cost or obligation (1) construction features that minimize the spread of infestation in your plant and (2) a program of sanitation that will keep your plant pest-free at lowest cost.

We welcome your inquiry for this constructive service to prospective users of WESTVACO METHYL BROMIDE.

Westvaco CHEMICALS

METHYL BROMIDE
FOR EFFECTIVE FUMIGATION

WESTVACO CHLORINE PRODUCTS CORPORATION
405 LEXINGTON AVENUE · NEW YORK 17, N. Y.
CHICAGO, ILL. GREENVILLE, S. C. NEWARK, CALIF.

Wide World

PEA VINING
Electric viners have taken care of this mass of discharged pea vines, in Walla Walla, Wash. They are about to be sold for ensilage and fertilizer use, the industry thus eliminating practically all waste on peas.

the serious tie-up of capital that it often incurs. In this manner a majority of member users of distilled spirits for nonbeverage purposes would qualify under the bond and permit system, while those who could not so qualify would be privileged to file for a drawback claim.

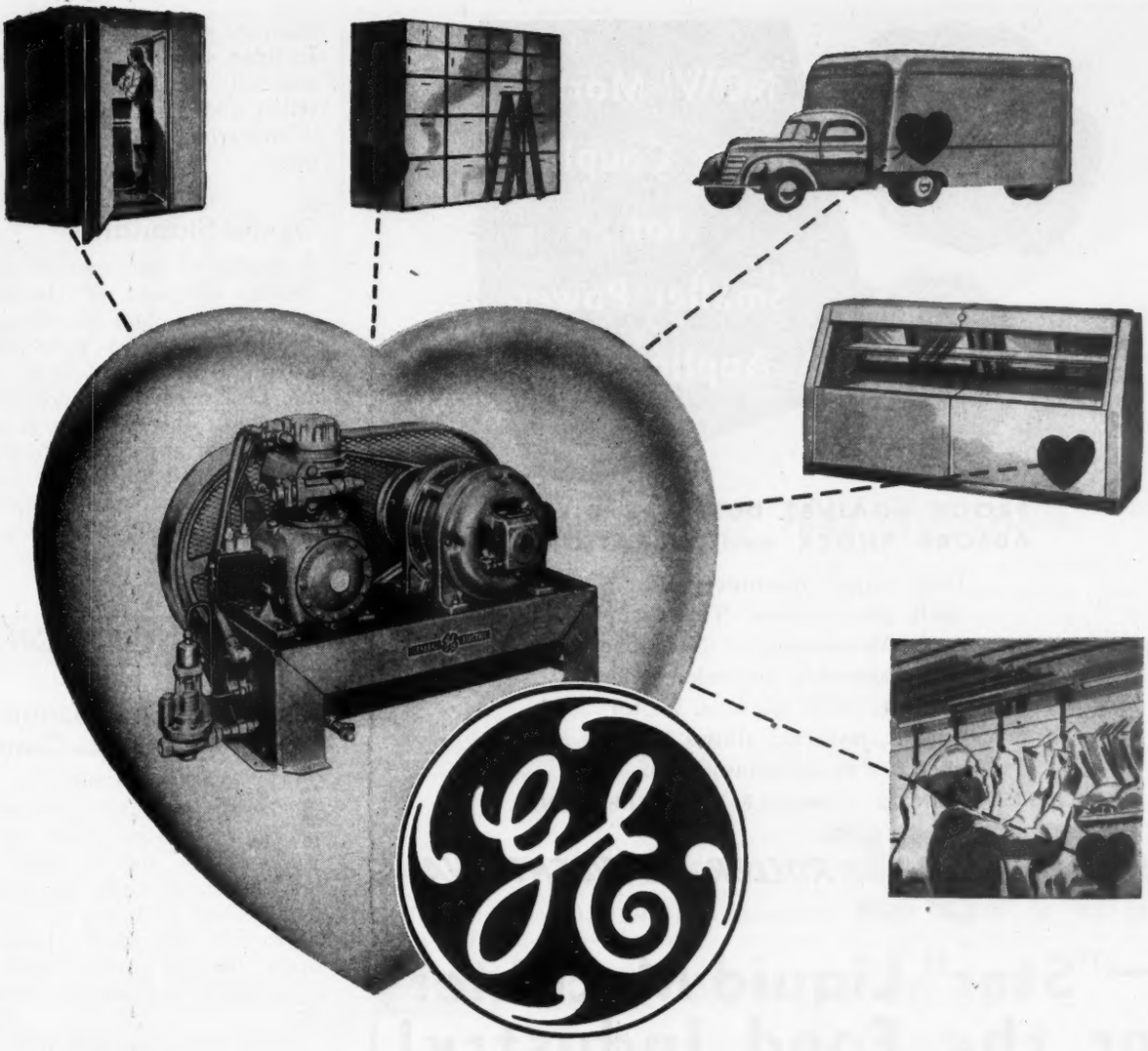
The association's alcohol tax committee anticipates a hard fight before convincing the Treasury Department and Congress that they are entitled to proper consideration in continuing the drawback claim proviso and, as an alternative, to amend the Revenue Act of 1946 to include the bond and permit system.

F&DA Issues Standards On Alimentary Pastes

FORMAL DECISIONS of Food and Drug Administration regarding macaroni and other alimentary pastes were published as standards on July 6 and July 9. The standards become effective on the 90th day following publication, which means October 4 for standards controlling the use of gluten, and October 7 for "enriched" products.

As described in FOOD INDUSTRIES' July issue (pages 132 to 134) it has been decided that the use of gluten should be restricted to the restoration of gluten quantities in these products comparable with the concentration obtainable when 13 percent of gluten wheat is used. F&DA declines to issue any standard for so-called "gluten" specialties of this group.

The new standards for enriched macaroni and other enriched products follow closely proposed standards previously published. These



The vital spot in your Refrigeration System

EFFICIENT, economical refrigeration . . . safety of perishables . . . trouble-free operation . . . they all depend upon the condensing unit . . . heart of your refrigerating system.

That's why it pays to take advantage of the service your G-E distributor has to offer. He will check your present unit for hidden waste. He will analyze your need for new equipment in relation to your future needs. He will help you keep your present unit (no matter what its make may be) going until a compact, modern G-E unit is available.

Remember, the G-E Condensing Unit is factory-tested and field-tested for a long life of service. It will do a vastly more efficient job than old-fashioned systems . . . and use only a fraction of the floor space previously needed.

Ask your nearest G-E distributor, today, to call and analyze your refrigeration needs. You'll find him listed under "Refrigeration" in your Classified Telephone Directory.

General Electric Company, Air Conditioning Department, Section 6898, Bloomfield, New Jersey.

GENERAL ELECTRIC

findings relate only to rather fully fortified products and it has been definitely forbidden to use these nutrient additions in the normal class of macaroni and related paste products.

Oyster Standards

FINDINGS of fact and the presiding officer's proposal of standards for raw oysters and shucked oysters were published by Food and Drug Administration on July 9. Protests and briefs were to be received until the end of July. Hence, it is not expected that any formal final findings can be issued until early fall. This means that a new standard, when adopted, will not take effect until at least the first of next year.

DISTRIBUTION

Remove Freezer Limits On 30-Lb. Containers

ALL QUOTA restrictions on the use of 30-lb. capacity containers, for packaging frozen foods, have been removed by the Civilian Production Administration. Restrictions on small users of containers also have been modified. Both changes were made through amendments to the container order, M-81, issued June 30.

Previously, hot pack processors of fruits and vegetables had been permitted unlimited use of hermetically sealed cans. This unlimited privilege now is extended to processors of frozen fruits and vegetables packing in 30-lb. cans. The latter group had been limited to 100 percent of their use of 30-lb. cans in either 1941 or 1945, except in the case of frozen cherries, which was limited to 100 percent of the 1944 use.

The amendment is expected to benefit bakeries, ice cream manufacturers and other food processors, who purchase frozen fruits in 30-lb. containers.

Milk Container

THE CIVILIAN Production Administration has assured producers of fluid milk shipping containers that sufficient materials would be available to them to maintain production at the current annual rate of 1,500,000 units.

This rate is approximately the amount needed to meet the replacement demand based on an indicated average eight-year life for such containers, the agency said.

PROOF AGAINST DUST and DIRT
ABSORB SHOCK and VIBRATION

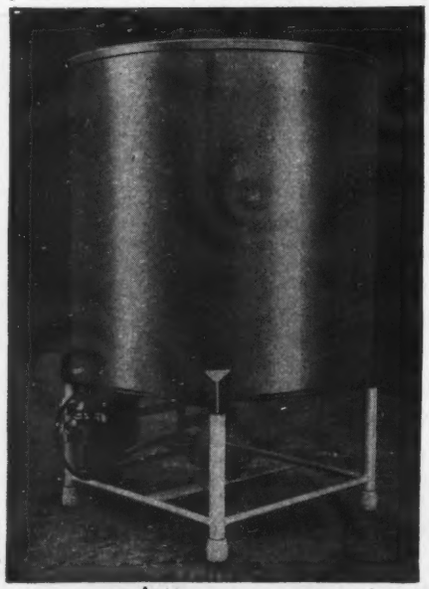
They extend machinery life in small power-drives. The exclusively Morse-designed Neoprene biscuit assembly, preloaded under pressure, *packs the load.* It's torsionally resilient; allows better, smoother power transmission.

MORSE CHAIN CO. • Detroit 8, Mich. • Ithaca, N.Y.

MORSE *ROLLER and SILENT CHAINS*
SPROCKETS • FLEXIBLE COUPLINGS • CLUTCHES

"Star" Liquid Machinery for the Food Industry!

★ NEW and MODERN DESIGN ★ LONGER LASTING ★
★ MORE SUBSTANTIAL ★



WE manufacture a complete line of:

Stainless Steel Mixing Tanks . . . Syrup Disc Filters . . . Water Disc Filters . . . Stainless Activated Carbon Filters . . . Sanitary Pumps . . . Stainless Steel Sand Filters . . . Valves and Fittings.

Also: Equipment made to your specifications.

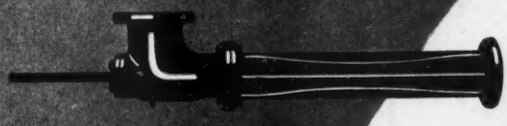
Send Specifications for Estimates!

The Star LIQUID MACHINERY CO.
MACHINERY FOR ALL LIQUID PURPOSES
OFFICE and FACTORY: 871 EDGEWATER ROAD, HUNTS POINT, BRONX 59, N. Y.

Steam-Jets FOR VACUUM SERVICE

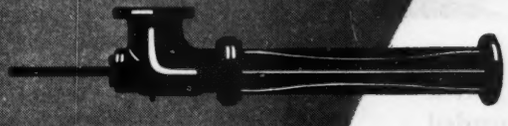
ANY VACUUM

Steam-Jet Ejectors can produce any pressure down to 100 microns (.004") Hg. Absolute. Ejectors termed "Thermal Compressors" are available for boosting steam through a moderate range of compression above atmosphere.



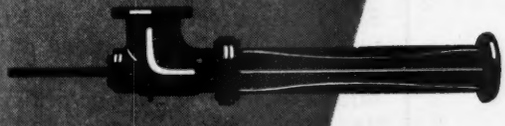
ANY CAPACITY

Ingersoll-Rand has an unlimited range of standardized sizes and types of ejector elements which can be combined to economically meet any capacity requirement.



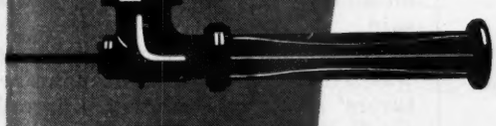
SUSTAINED EFFICIENCY

The Steam-Jet Ejector is a machine without moving parts. There is nothing to wear out or require lubrication. Efficiencies are maintained for long periods.



LOW MAINTENANCE

Strong sturdy construction, simplicity of design, and choice of correct materials mean long life and low maintenance for every I-R Steam-Jet Ejector.



BROAD APPLICATION

Wherever vacuum is used in a manufacturing process, there is an application for Steam-Jet Ejectors. An examination of the vacuum services in your plant may reveal an application for Steam-Jet Ejectors that will result in product improvement and reduced processing costs.

SEVENTY-FIFTH IR ANNIVERSARY

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Available in 5-lb. cans 100-lb. drums
Easy to use
A great Bactericide in the FOOD INDUSTRY
PERCHLORON
A Stable Calcium Hypochlorite Powder for use as a Sterilizing and Deodorant
PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals
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PERCHLORON is a desirable source of chlorine, quick acting and not injurious to metals, at recommended concentrations. Perchloron will not impart odors or flavors to food products which contact sterilized utensils.

AS A BACTERICIDE, PERCHLORON IS USED IN:

Milk separators and ice cream freezers

Cream and cheese factory utensils

Preserving, baking and candy-making utensils

Bottle washing equipment

Cannery equipment

Tanks and tank cars

Tables, shelves and floors

Other Penn Salt Products for the Food Industry

B-K Bactericide
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Can Supply Unchanged Despite More Pig Tin

THE SUPPLY of tin cans will remain unchanged in spite of the increase of 10 percent in third quarter allocations of pig tin. The production of steel strip remains inadequate to meet the requirements of the tin can order M-81, and government officials in close touch with the situation do not expect production of tin plate to satisfy demands until the last quarter of 1946 or the first quarter of 1947.

The increase in tin quotas for the present quarter over the second quarter of 1946 in reality is merely a means of carrying over the unused portions of previous allocations. As the tin order M-43 was originally set up, unused portions of the first quarter quota could be carried over into the second quarter. The order did not, however, provide for a similar carry-over into the third quarter. The July 5 amendment takes care of this.

It also gives greater flexibility for the operation of industry by specifying quotas by companies rather than by products. Under the previous regulations the manufacturers of solder and bearing metal could not use the tin allocated for one product in the production of another regardless of the demands of their market. The amended order permits the manufacturer to make whatever product his customers demand.

1945 Candy Production Shows Slight Decline

SALES of confectionery by manufacturers in the United States during 1945 were estimated at 2,562,000 lb. valued at $620,000,000 according to the Department of Commerce. This compares with 2,804,000,000 lb. valued at $658,000,000 during 1944 when production and sales reached an all-time high annual level, it was said.

The value of sales to consumers was greatly in excess of manufacturers' receipts because of a normal retail markup of about 50 percent, it was pointed out.

These estimates are based upon voluntary reports to the Department of Commerce by 404 manufacturers who account for 77 percent total annual sales.

The decline in production and sales, which was almost unnoticed during the first three months of 1945, became apparent in the second quarter when sugar rations for confectionery manufacturers were reduced from 70 to 65 percent of 1941 con-

4-WAY MIXING ACTION

Assures Uniform, Perfectly Blended Batches with Sturtevant *Rotary Batch Blenders*

Sturtevant Blenders handle all intake and discharge through one opening. Simple, single lever opens and closes gate. Illustration at left shows machine receiving . . . right discharging.

Because Sturtevant Rotary Blenders use a 4-way mixing action, they provide a *thoroughly blended product* no matter what the ingredients . . . densities . . . weights . . . finenesses . . . or other physical properties of the materials to be blended.

Here's how they operate—as materials are poured into the receiving hopper, they are picked up by the revolving buckets, and carried to the top of the blending chamber where they are cascaded and intimately mixed. At the same time the drum revolves forcing the materials from both ends toward the center of the drum . . . while the swinging chute, which is in the blending position produces an important lateral fourth mixing action. The result, a perfect blend with *no* substances floating to remain unmixed.

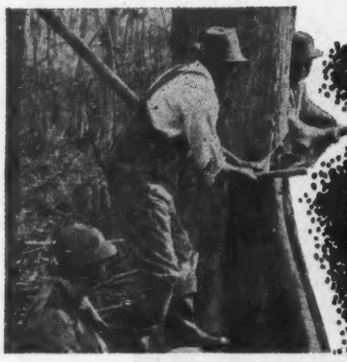
Investigate Sturtevant Rotary Batch Blenders. They are available in many sizes with capacities from 1000 to 7500 lbs. Write for details and specifications.

STURTEVANT MILL COMPANY

84 Harrison Square, Boston 22, Mass.

Designers and Manufacturers of

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS



TIDEWATER
RED CYPRESS
Is the Answer to Any Problem of DECAY, ODOR, TASTE or ACID!

...Its Superior Qualities Make It Ideal for a Wide Range of Industrial Uses

The Indians knew it, the Spaniards knew it, the French knew it, and those of English decent of the Southeastern regions have known for 150 years the superior qualities of Tidewater Red Cypress and its resistance to decay. Along the Atlantic Coastal Plain where lie buried cypress trees that grew over 100,000 years ago in the Pleistocene Age, many of which have since been dug up, give mute evidence of the lasting qualities of cypress never equalled for its decay resistance. In more recent years industry has also learned that it licks the difficulties of odor, taste and acid. Tidewater Red Cypress has ALL the qualities you demand for many specific industrial demands.

Tidewater RED CYPRESS

Tidewater Red Cypress "The Wood Eternal"

CAN BE FURNISHED FROM ST. LOUIS STOCKS

FLEISHEL LUMBER CO.
4230 DUNCAN AVE. • ST. LOUIS 10, MO. • NEwstead 2100

This Cyclone Flat Wire belt stays in operation for long periods with a minimum of attention. Open areas allow maximum circulation of air—permit thorough cleansing.

CYCLONE . . .
specialists in metal conveyor belts!

U·S·S Cyclone Metal Conveyor Belts are made in *three* types: Flat Wire, Chain Link, Flex-Grid — all designed for efficient, long-lasting service. Our salesmen will gladly help you choose the type and wire specifications that best meet *your* particular operating conditions. Cyclone quality is your guarantee of dependability. Sales offices in principal cities . . . factories in Middle West and on Pacific Coast. Take advantage of Cyclone's 25 years of experience in making metal conveyor belts. Our technicians will be glad to consult with you. Write for Catalog No. 3. No obligation.

By the makers of Cyclone Fence

CYCLONE FENCE DIVISION
(AMERICAN STEEL & WIRE COMPANY)
Dept. H-86, Waukegan, Illinois
United States Steel Export Company, New York

USS CYCLONE METAL BELTS — CYCLONE FENCE DIVISION · American Steel & Wire Co. — UNITED STATES STEEL

UNITED STATES STEEL

sumption. Output was further restricted during the July-December period when rations were cut to 50 percent of 1941 consumption, the lowest level since sugar rationing was started in 1942. Manufacturers could have increased sales by one-third if production had not been limited by shortages of materials.

Per capita consumption of confectionery during 1945 totaled 18.7 lb. compared with a record high annual consumption of 20.5 lb. during 1944.

While manufacturers' sales of confectionery generally declined during the year, packaged goods, especially lines selling at more than $1.00 a lb., and chocolate-covered bars increased. Sales of package goods were valued at $107,410,450; bulk goods, $69,144,785; and other five and ten cent specialties, $43,488,875.

No Coffee Controls

THE United States Department of Agriculture declares that it does not plan, at this time, to reinstate import controls over coffee brought into the United States, notwithstanding previous announcement to the effect that such controls were suspended for the duration of the subsidy period.

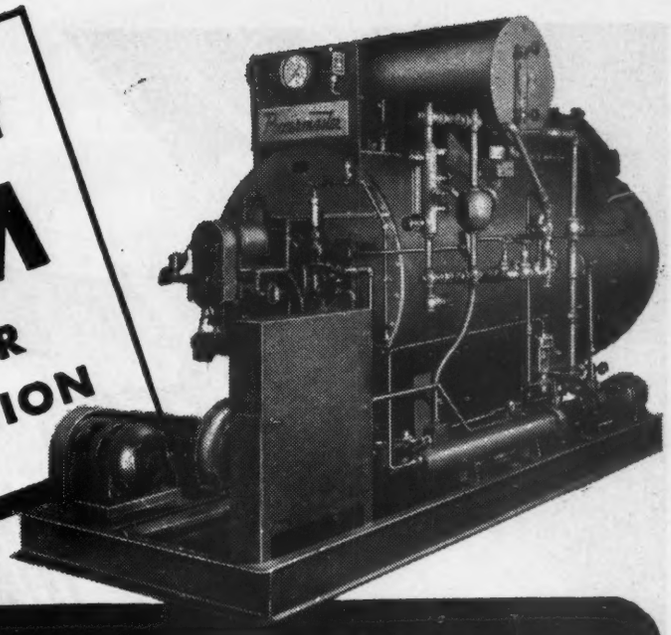
Controls governing the importation of coffee under War Food Order 63 were removed on November 29, 1945. The action was taken in compliance with a directive from the Office of Economic Stabilization, which called for subsidy payments to importers of green coffee.

Wide World

FOOD EXPERTS

Deciding apparently that there might be some room for improvement in the way their elders were handling the multiple food problems of the world, the younger fry held a youth food conference in Washington, last month. Here are some of them being greeted by President Truman. (P. S.—The young lady shaking hands is from St. Louis, Mo.)

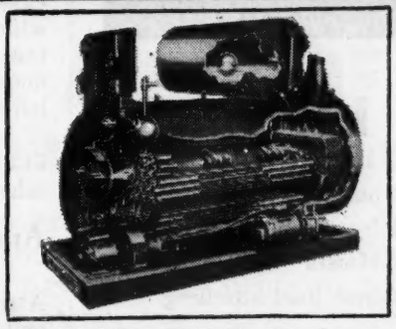
FAST LOW-COST STEAM WITH LIGHT OIL OR HEAVY OIL OPERATION



O&S Powermaster

THE AUTOMATIC "PACKAGED" STEAM GENERATOR

IT'S ALL IN THE ENGINEERING



Some of the Powermaster's advantages are clearly shown by a "cutaway" view which discloses its efficient, cost-saving 3-pass design:

1. *COMPLETELY AUTOMATIC*—All controls for automatic operation on convenient panel—unit starts with a flick of the switch and operates without manual attention.

2. *CONDENSATE RETURN SYSTEM*—Compactly mounted as integral part of unit; maintains water level and feeds make-up water automatically.

3. *OIL BURNER*—Especially designed by O&S engineers for light or heavy oil operation and built for maximum heat with less fuel.

4. *ROTARY FLAME*—The Powermaster's "spinning flame" results in highest heat transfer utilizing all possible B. T. U.'s.

5. *FORCED DRAFT OPERATION*—A stack is not needed for draft and heat is retained *inside* boiler; only a small vent pipe is required to carry flue gases outside.

60 YEARS of boiler engineering and manufacture are behind the new O&S Powermaster Unit. Boiler—oil burner—condensate return and control systems are combined in one compact steam plant. Tested to A. S. M. E. standards, shipped complete and installed in a few hours. Descriptive bulletin will be mailed without obligation—please send coupon below.

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Please mail the new 8-page O & S Powermaster Bulletin #1214, without obligation, to:

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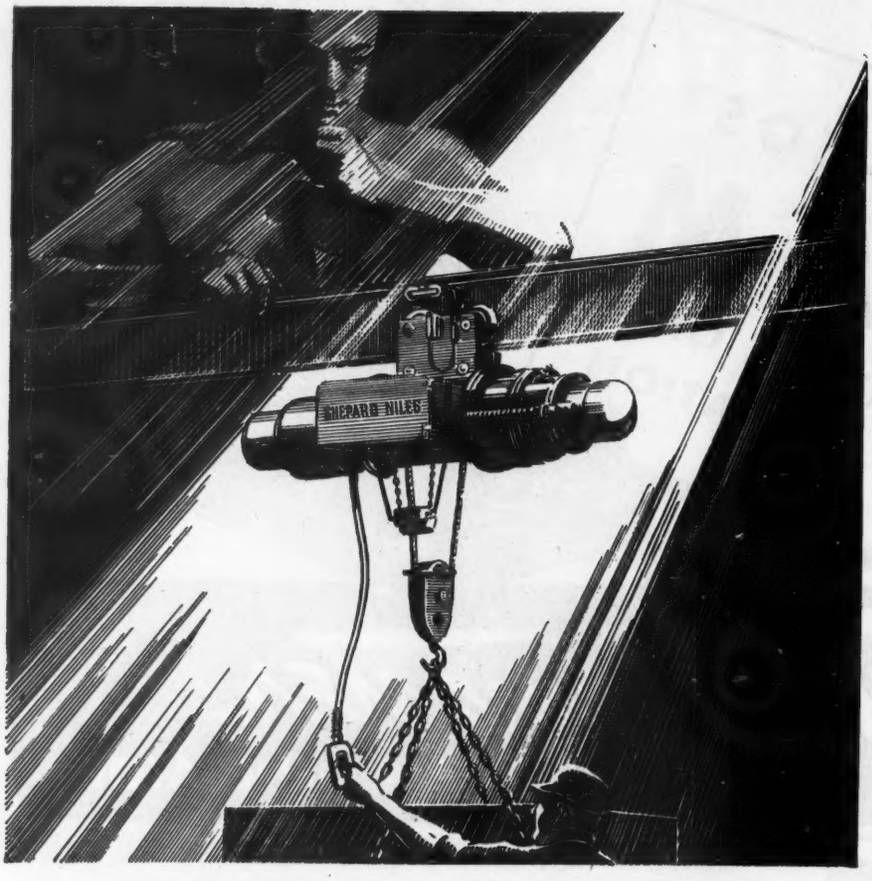


STURDY LOAD LIFTER

• Never jerky, never faltering—tirelessly handling the most delicate loads as if picked up and placed by nimble fingers. This is the dependability of Shepard Niles Hoists—built with the staying power of a champion for constant load-handling with precision and safety.

Manufacturers want the most efficient, most economical handling equipment they can buy. Now more than ever this equipment must fit their particular handling requirements. Shepard Niles Hoists handle loads up to their full rated capacity with a minimum of maintenance cost—giving long durable service.

SHEPARD NILES CRANES are advanced in performance and in every detail of construction—a real contribution to efficient load-handling. They are designed and constructed to sustain high efficiency throughout a long, rugged life. Engineered construction gives dependable, smooth operation at low cost.

Shepard Niles
CRANE & HOIST CORPORATION

To assist you in selecting such a competitive advantage as economical load-handling, Shepard Niles offers you the use of its engineering facilities and staff—without obligation.

422 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

U. S. Food Exports Top 16,000,000 Tons

IN COMMENDING the food industries and the people of the U. S. for their response in providing food for export, President Truman last month revealed that this country had shipped about 40 percent of its wheat, more than 35 percent of its rice, more than 20 percent of its cheese, over 10 percent of its fats and oils and about 6 percent of its meat, during the year ending June 30.

Both the President and Secretary of Agriculture Anderson stressed the continuing urgency of relief needs even though the worst immediate dangers of famine have been forestalled. When this year's harvests are completed, Anderson said, a good deal more would be known about the situation. He revealed that the planned export of wheat for the 1946-47 crop year, was up to 250,000,000 bu., 150,000,000 bu. under this year's actual shipments. Tentative plans are also being made for other commodities, he said.

Total food exports for 1945-46 came to 16,700,000 long tons, of which 10,336,000 long tons were in the grain equivalent of wheat and flour. Other grains came to 1,411,000 long tons, while long ton shipments of fats and oils came to 356,000, meat 614,000, dairy products, 764,000 and other food, 3,219,000.

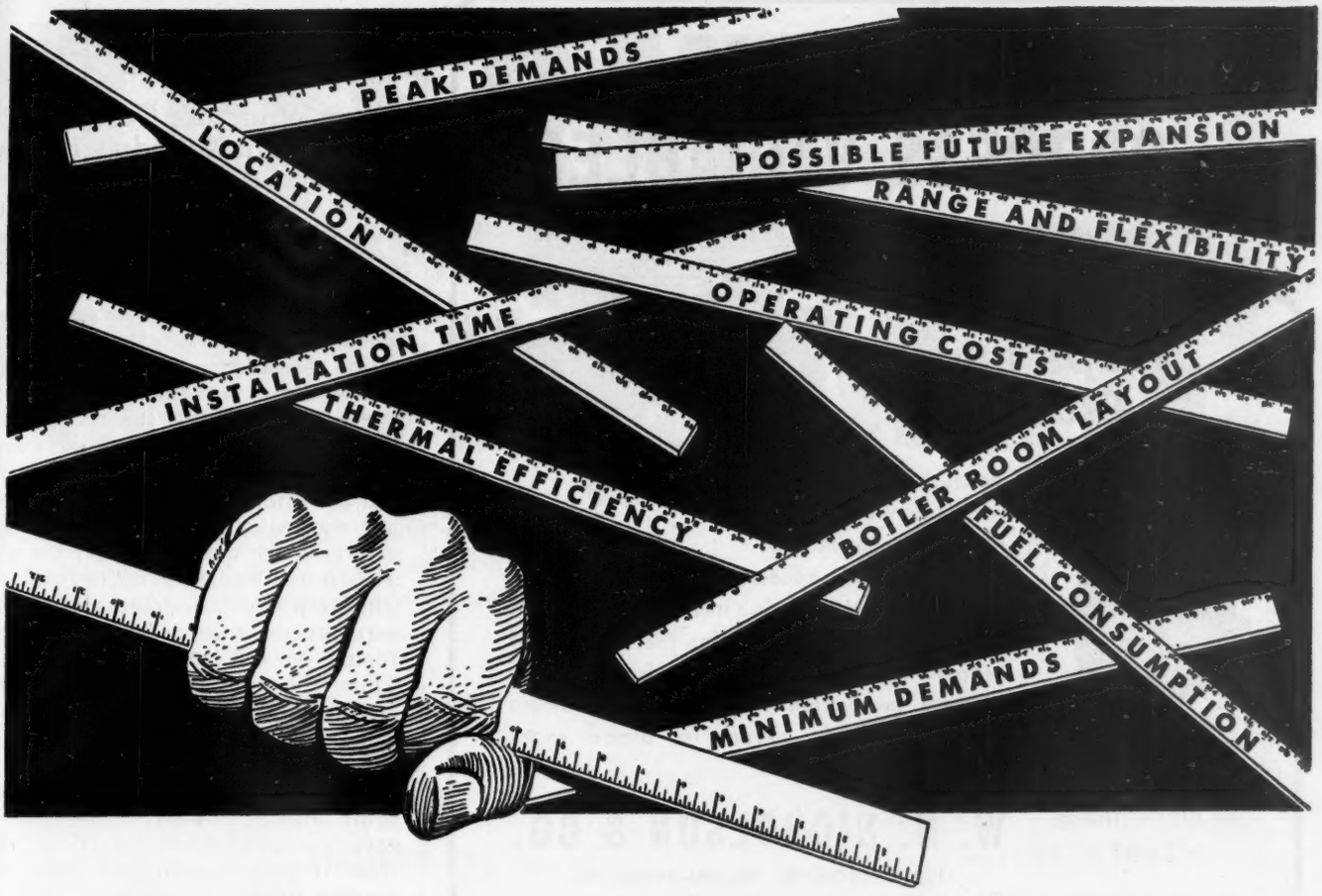
American Food Brands Make European Friends

AMERICAN BRAND names of canned and processed foods and medical supplies are making the United States new friends in European countries being serviced by the United Nations Relief and Rehabilitation Administration, according to Joseph Lilly, director of public information of UNRRA.

In answer to inquiries by the Brand Names Research Foundation, Mr. Lilly wrote, "We have had, in fact, specific evidence of this from UNRRA representatives abroad. For example, an excerpt from a cable from the UNRRA Mission in Russia, May 9, 1946, states:

" 'UNRRA foods (in Minsk) are prominently displayed in show windows and shelves, original labels and brand names intact on all commodities except lard, beans, peas, etc., shipped in bulk.' "

Mr. Lilly points out that brand names have an extremely wide circulation among the peoples of Europe, possibly greater than at any other time, and that Europeans consequently are more familiar with them.



WE USE A LOT OF YARDSTICKS

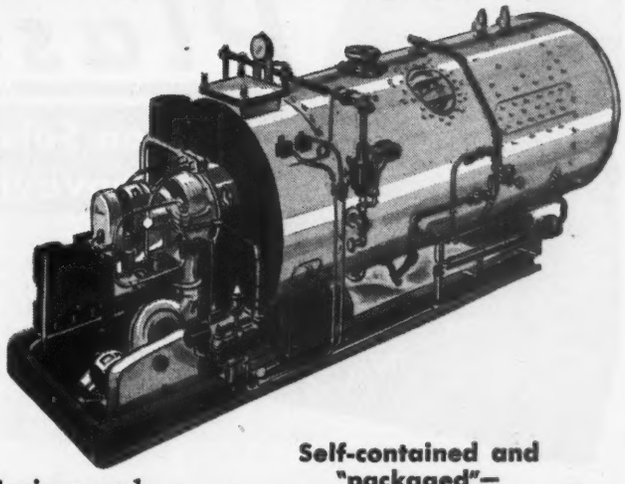
to help you select the proper steam generating equipment!

Fuel and steam costs are usually major items in production and plant operation. That's why it pays to have a steam plant designed to meet your steam loads most efficiently.

Cleaver-Brooks does not sell you a steam generator "off the shelf." Your steam requirements on the basis of present loads and future growth are first analyzed by a Cleaver-Brooks engineer and recommendations are then made for your specific needs.

With sound application engineering of this kind plus basically sound steam plant design and construction, the maximum of lasting value is provided by your Cleaver-Brooks steam generator from the day it is installed. *Write for bulletin and complete information.*

CLEAVER-BROOKS COMPANY, 327 E. Keefe Ave., Milwaukee, 12, Wis.



Self-contained and "packaged"—

Delivery consists of a "packaged" unit. Connections to service outlets are all that is needed. No smokestack is used — a simple vent carries away all products of combustion. No extra foundation is required. Compact — the unit fits into limited space and low headroom locations. Sizes: 22 models — 15 to 500 hp; pressures 15 to 200 lbs. p.s.i.

Money-making performance—

The Cleaver-Brooks Steam Generator is designed for easy operation and low upkeep cost. Operation is at 80% efficiency from full load down to 30% of its rating. The high heat transfer from the 4-pass, down-draft boiler produces fast steaming. A boiler room as clean as the home or office is possible through use of oil for fuel.

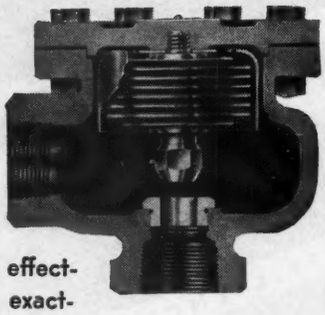
WRITE on your business letterhead for the Free Steam Cost-Calculator — a ready-reference slide rule showing the comparative steam costs when using oil or coal as fuel.

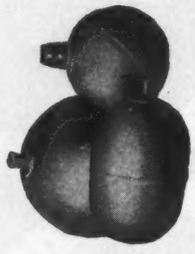
Cleaver-Brooks
STEAM
GENERATORS

BETTER CONTROL OF PROCESS VARIABLES

Assured with

NICHOLSON
Traps and Floats





Because they so effectively combine exactness of control and ability to take necessary abuse, Nicholson traps and floats are being increasingly adopted by producers in systems for the removal of process variables. Plant records show they increase production and aid in maintaining quality standards. Types for almost every processing application.

Send for BULLETINS or See Our Catalog in Sweet's

W. H. NICHOLSON & CO.
193 OREGON ST., WILKES-BARRE, PA.

This Modern Miracle in Food Belting

PlasTex

Can Solve Your Food Conveying Problem

Here it is! A fully pliable plastic coated belting that is impervious to oils, greases, acids, alkalis and moisture—PlasTex belting. Now you can convey hot or cold, wet or dry substances of every nature—month after month on this remarkable belting—it won't pick up or give off odors—it will clean more easily—and last many times longer than uncovered belting.

Famous "Buffalo" Quality

Beneath the protective plastic coating is time-honored Buffalo solid woven cotton carcass, proved in use for over half a century. Join the hundreds of leading food processors already enjoying the benefits of PlasTex belting in their plants.

Write for sample and the name of your nearest supplier.

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BUFFALO WEAVING & BELTING COMPANY
Chicago Buffalo 7, N. Y. New York
Serving Industry for Over Fifty Years

RAW MATERIALS

Swap Wheat for Corn But Nobody's Happy

DURING the spring months manufacturers of corn starch and its products were so hard put for corn that some of them are reported to have found themselves in the wheat business. With the government begging for wheat to meet its export commitments, these corn starch processors bought up wheat at black market prices, then swapped their wheat for the corn the Commodity Credit Corp. had paid premium prices to load itself up with, only to find that it was not wanted overseas. Many wheat growers, who were riled over the set-aside order, would sell to feed millers, who were also corn processors or had corn processor connections while refusing to sell to the government. Thus, the way was paved for the swapping on a bushel for bushel basis.

Despite such shenanigans, however, the corn processors faced a difficult summer, even though some corn was available after OPA's demise, if the processor could meet the soaring prices.

Food Chemists Find Young Peas Are Best

IN A STUDY of the vitamin content of Alderman peas at several stages of maturity, food chemists at the State Experiment Station at Geneva, N. Y., have shown that, in general, the younger the peas, the higher the vitamin content. Thus, high nutritive value, flavor and tenderness were closely associated.

The Alderman pea was chosen for study because it is extensively used by commercial processors for quick freezing, and it was thought that information on its behavior would be of considerable value. Lots harvested at different times over a ten-day period were analyzed for ascorbic acid, or vitamin C; carotene, the precurser of vitamin A; and thiamin and riboflavin of the vitamin B complex. Tenderometer readings made at the different harvest dates ranged from 62 for the earliest harvest to 140 for the last picking.

The results showed that the vitamin C content dropped as the peas matured beyond the fancy stage. The oldest sample, with a tenderometer reading of 140, contained 36 percent less vitamin C than the sample with a tenderometer reading of 80. On a fresh basis, carotene and riboflavin showed no change with maturity,

GLASS RATES 2 to 1
AS THE PREFERRED FOOD PACKAGE
AMONG HOUSEWIVES!

A glass container helps attract, sell and *keep sold!* Women voted 2 to 1 for glass-packed foods* in a recent national survey conducted by a noted public opinion analyst**!

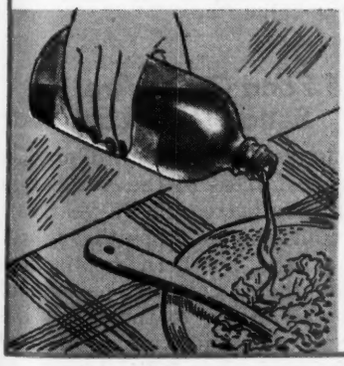
Here are some of the reasons why women prefer to buy foods in glass:

PROTECTION

Coffee, for example, is delivered at the peak of its freshness, and the Ultra-Vac jar may be re-sealed after each use.

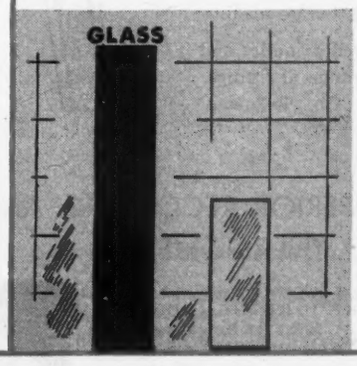
ATTRACTIVENESS

Glass containers are so attractive that many of them (for pickles, preserves, etc.) are placed right on the table.



CONVENIENCE

Time- and work-saving advantages are largely responsible for such preferences as the 4 to 1 for salad or cooking oil in glass. Easy to pour. Easy to clean. No waste.



PREFERENCE

The preference for glass is particularly noticeable among younger housewives. The overwhelming vote of 3 to 1 for glass-packed foods by this group is a definite trend.*

The popularity of glass containers is growing . . . growing because their many advantages are basic. You sell more—need less selling time—with products packed in glass containers—Duraglas Containers!

*Average is based on eight key classifications: pears, peaches, fruit salad and cocktail, baby food, coffee, salad or cooking oil, beets, food-beverages.
**Name supplied on request.

ESPECIALLY IN Duraglas CONTAINERS
TRADE MARK REG. U. S. PAT. OFF.

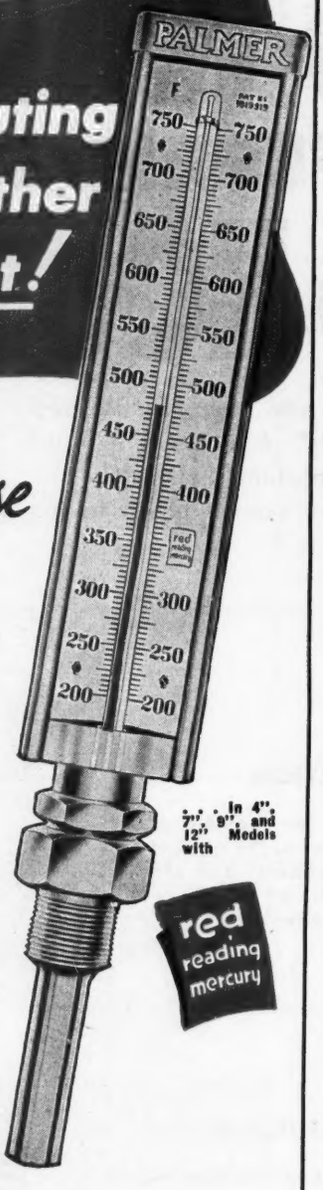
OWENS-ILLINOIS GLASS COMPANY • TOLEDO 1, OHIO • *Branches in Principal Cities*

We're Shouting About Another Palmer First!

A SENSATIONAL NEW THERMOMETER WITH

Extruded Brass Case

(PATENTED)
DUST-PROOF
FUME-RESISTANT



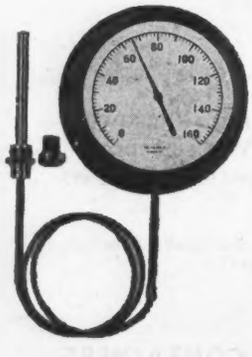
Palmer — originators of famous "Red-Reading-Mercury" are first again with a sensational new Thermometer. This new Thermometer features an Extruded Brass Case with V-shape design, patented by PALMER. The case is fume-resistant, dust-proof, and much more attractive — with pleasing contours and a durable nickel finish.

Equally important, the V-shape design offers a *much larger scale* for easier reading plus greater protection to the tube. Other important features of this new Thermometer are: double-strength, non-rattling glass shield; "snap-on" cap for easy removal of shield; and "Red-Reading-Mercury" for quick, accurate reading.

This Thermometer is ruggedly built and very adaptable, with a wide range of fittings. Send for detailed Bulletins No. 46-2 and No. 46-3.

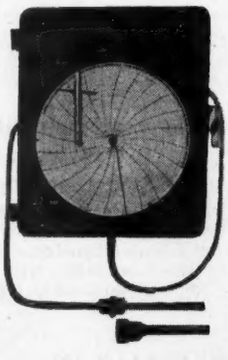
In 4", 7", 9", and 12" Models with

PALMER SUPERIOR RECORDING AND DIAL THERMOMETERS



RECORDING THERMOMETERS. Mercury Actuated. 12 in. die-cast aluminum case. Flexible armoured tubing and bulb of stainless-steel. All ranges up to 1000F or 550C.

DIAL THERMOMETERS. Mercury Actuated. 8 in. case. Flexible armoured tubing and bulb of stainless-steel. All ranges up to 1000F or 550C.



PALMER THERMOMETERS INC.

2529 Norwood Ave., Cincinnati 12, Ohio
Canadian Plant: King and George Sts., Toronto 2

Mfrs. of Industrial, Laboratory, Recording and Dial Thermometers

Wide World

UNRRA FOOD

This is just one of the many scenes made possible by the shipment of more than 16,000,000 tons of food from the U. S. during the past year, as reported by the President.

while thiamin increased steadily as the peas matured but was only 8½ percent higher in the older of the two samples. From the viewpoint of nutritive values, therefore, as well as flavor, the younger peas were regarded as superior.

Based on dry weight, all of the vitamin values dropped significantly as the peas matured, and again the data show that the younger peas were better from the standpoint of nutritive value.

World Food Crops Are Better Than Last Year

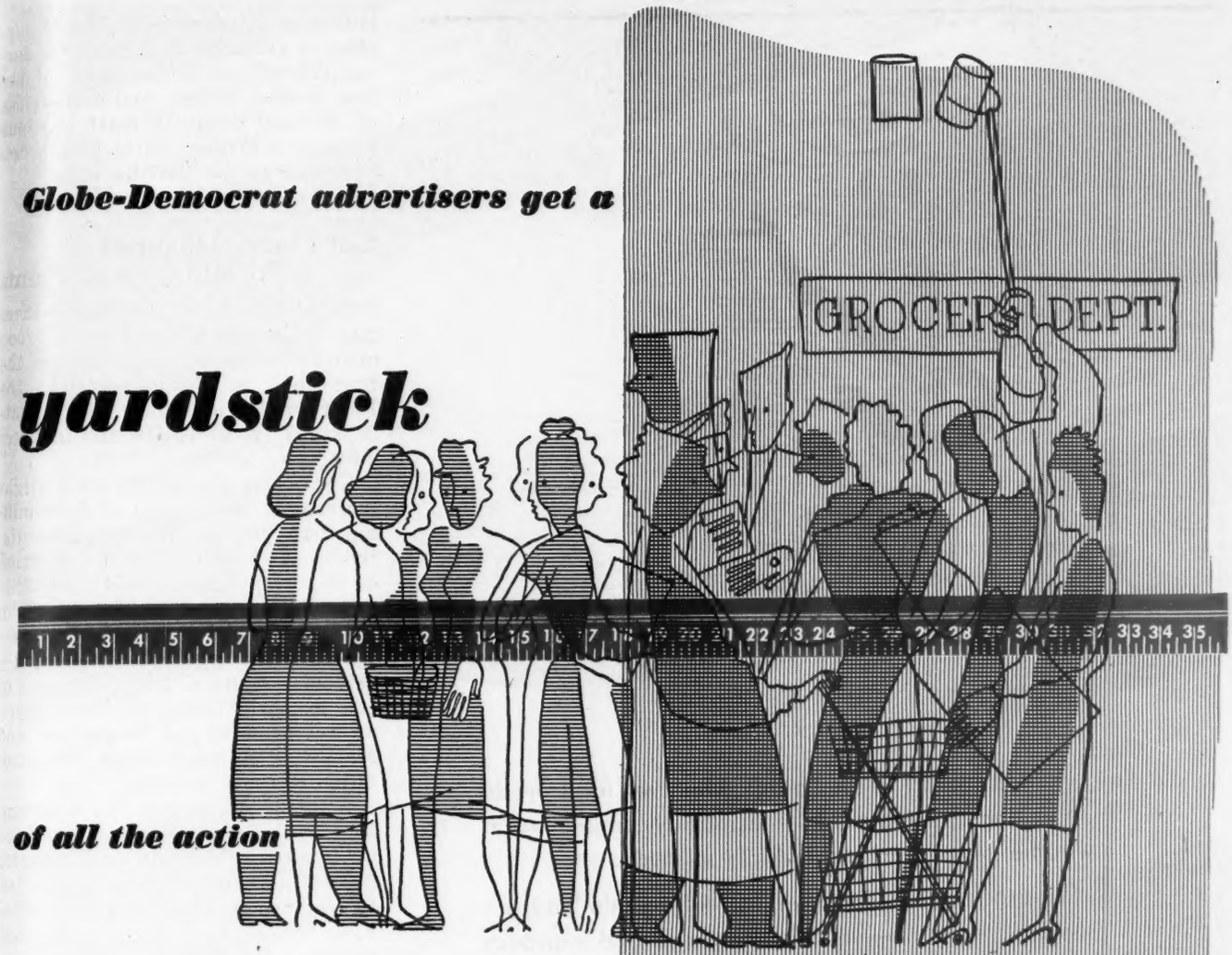
CONDITIONS AFFECTING food production in most areas of the world were substantially better than a year earlier in mid-June as crops throughout much of the northern hemisphere reached their critical period of growth, according to the U. S. Department of Agriculture's Office of Foreign Agricultural Relations.

Although there has been some increase in crop acreage, the total world acreage in food crops is still below prewar. Yields are being restricted despite favorable weather by shortages of fertilizer, draft power and other production facilities.

Assuming that present crop producing conditions continue until harvest, the world's food output in 1946-1947 will be somewhat larger than the relatively low levels of 1945-46, but definitely below prewar, particularly on a per capita basis. In addition, preharvest food stocks are at

Globe-Democrat advertisers get a

yardstick



of all the action

in St. Louis' Grocery Store Market

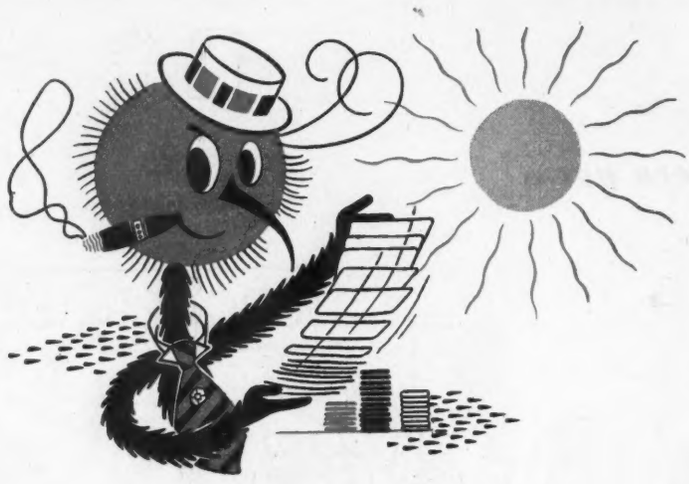
Measuring the sales appeal of packaging, merchandising and advertising is easy in St. Louis. A continuous survey of the area's grocery store sales is furnished to GLOBE-DEMOCRAT advertisers. Reporting on 450 products in 27 grocery-store classifications, this accurate audit shows what you're doing . . . what your competitor is doing. This *plus* service helps GLOBE-DEMOCRAT advertisers do a better job.

Why not write for complete information?

. . . and did you know that more than [redacted] of the St. Louis Market is outside the City Limits?

That means you really have to "get around" in the St. Louis area. And you can. Just come along in the St. Louis Globe-Democrat . . . it's the city's only daily that even claims to cover successfully the surrounding area . . . 87 rich counties in Eastern Missouri and Southern Illinois.

St. Louis Globe-Democrat



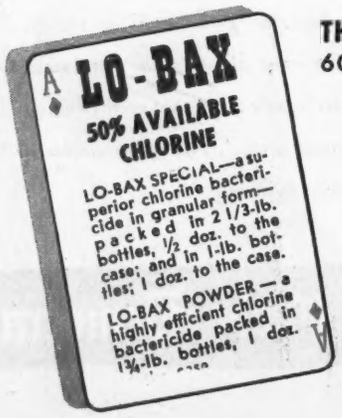
DON'T GAMBLE
WITH FAST-BREEDING BACTERIA
. . . USE LO-BAX

It's smart to use Lo-Bax wherever food products are handled—especially during warm weather when bacteria multiply so much faster.

Lo-Bax, the concentrated, fast-killing chlorine bactericide, helps prevent food spoilage and improves quality standards by rigidly controlling bacteria and sanitizing all surfaces with which food comes in contact.

Easy to handle—Lo-Bax kills bacteria almost instantly . . . at amazingly low cost. It contains 50% available chlorine, dissolves quickly in water—hot or cold, hard or soft—to make clear rinse solutions.

Order Lo-Bax from your supply house today! It's just what you need for safe, sure control of bacteria this summer.


LO-BAX
50% AVAILABLE CHLORINE
LO-BAX SPECIAL—a superior chlorine bactericide in granular form—packed in 2 1/3-lb. bottles, ½ doz. to the case; and in 1-lb. bottles; 1 doz. to the case.
LO-BAX POWDER—a highly efficient chlorine bactericide packed in 1¾-lb. bottles, 1 doz.

THE MATHIESON ALKALI WORKS (Inc.)
60 E. 42nd St., New York 17, N. Y.

Mathieson
LO-BAX
CHLORINE BACTERICIDE
50% AVAILABLE CHLORINE

Lo-Bax . . . Super-Nufos . . . HTH-15 . . . Dry Ice . . . Carbonic Gas . . . Ammonia, Anhydrous & Aqua . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Liquid Chlorine . . . Chlorine Dioxide . . . PH-Plus . . . Synthetic Salt Cake . . . Sodium Chlorite Products . . . Sodium Methylate

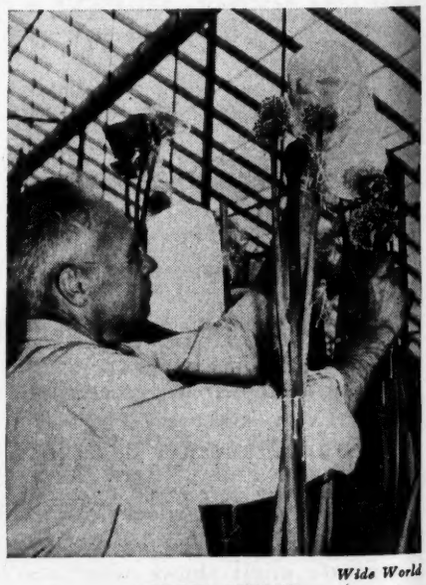
low level. Consequently, total supplies of available food products during 1946-47 will not be much higher than a year earlier, and careful use of all food products must continue to avoid a critical world food shortage prior to the 1947 harvest.

Cut Flour Deliveries To Mill-Owned Plants

THE AMOUNT of flour that millers may deliver to themselves, as food manufacturers, is restricted for the first time by amendments to the Flour Production Order 144, recently issued by the USDA and in effect July 1.

The action also allows for a slight increase in the amount of flour millers may produce for domestic distribution by permitting the addition of 85 percent of the average monthly quantity delivered to the Army in 1945. This increases the total permitted grind by approximately 2½ percent, or almost 7,000,000 bags of 100 lb. each. Grindings for export, or deliveries to the Production and Marketing Administration are in addition to these amounts.

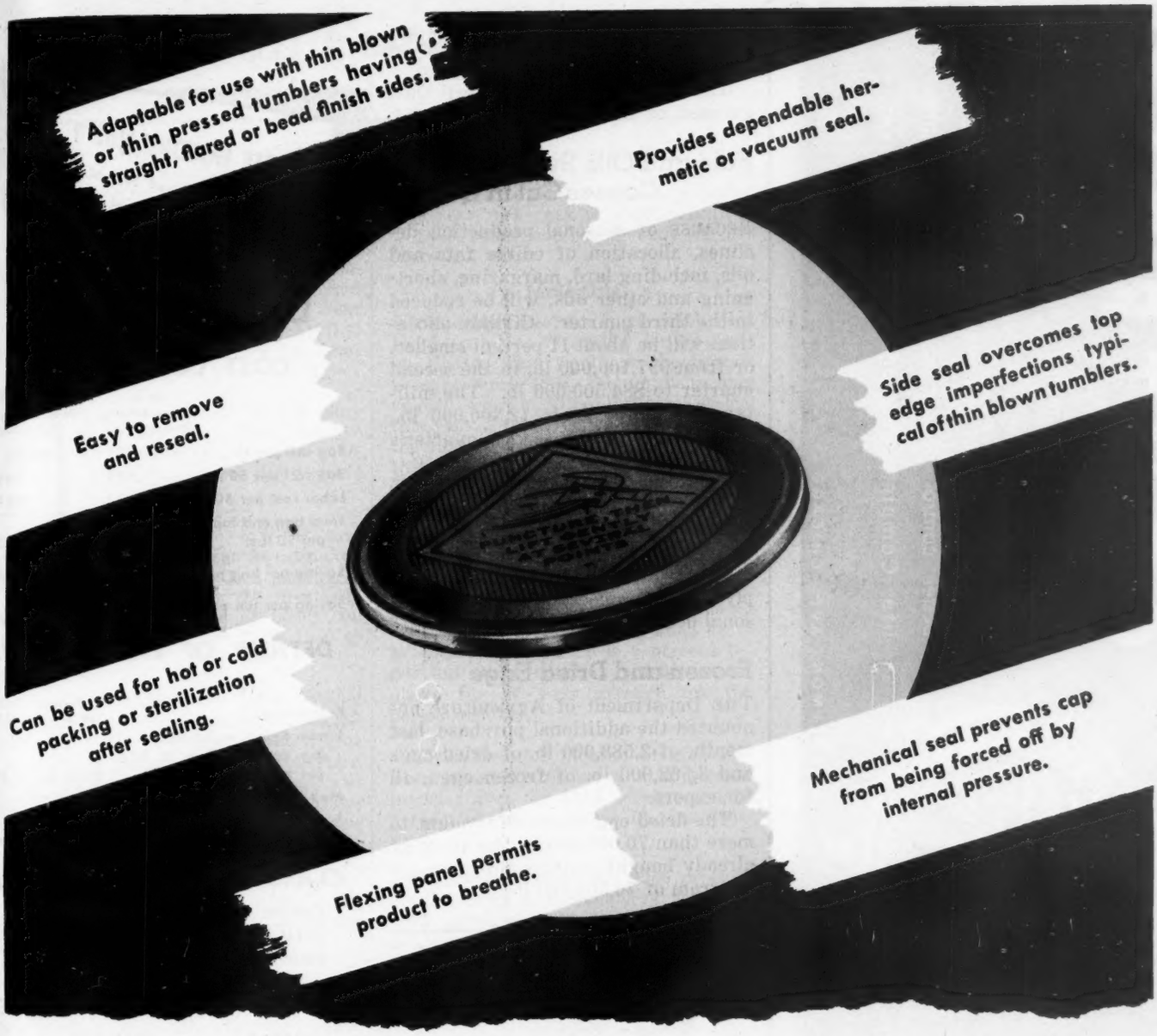
A third requirement is a 5 percent set-aside of each month's permitted production for delivery as designated by the administrator of the order. Persons to whom delivery is directed have ten days in which to furnish millers with shipping instructions. If no instructions are forthcoming



Wide World

HYBRID ONIONS

Among the achievements at the USDA Plant Industry Station, Beltsville, Md., are hybrid onions, said to yield 50 percent more than the usual early varieties in those western states to which the hybrid is adapted. Dr. H. A. Jones, of the station, is seen here inserting flower heads, of two plants to be crossed, in a cloth bag. The head of the debudded female flower is at the top.


Adaptable for use with thin blown or thin pressed tumblers having straight, flared or bead finish sides.
Provides dependable hermetic or vacuum seal.
Easy to remove and reseal.
Side seal overcomes top edge imperfections typical of thin blown tumblers.
Can be used for hot or cold packing or sterilization after sealing.
Mechanical seal prevents cap from being forced off by internal pressure.
Flexing panel permits product to breathe.

This Anchor Cap Will Suit You to a "T"

THE ANCHOR T CAP is designed for use on all types of thin blown or thin pressed tumblers. Its mechanical side seal, effected by a flexible gasket, overcomes the two difficulties common to thin blown tumblers, particularly; top edge imperfections and the variations in finish size.

Since the cap is held in place mechanically rather than merely by a vacuum, it is unnecessary to allow headspace when packing. Nor will internal pressure caused by sterilizing or by exposure to sun or heat loosen the seal or force the cap off its container.

Other advantages include its adaptability. The Anchor T Cap is suitable for hermetic or vacuum sealing, hot or cold packing and sterilization after sealing.

Users like it because it's easy to remove and because it serves as an effective closure to protect unused contents.

Tune in "Casey, Crime Photographer" every Thursday evening, entire Coast-to-Coast Network, CBS.

Anchor
CONTAINERS and CAPS

PRODUCTS OF
ANCHOR HOCKING GLASS CORPORATION
LANCASTER, OHIO

MERCOID CONTROLS

Hermetically sealed mercury switches used exclusively in all Mercoid Controls. They are not affected by dust, dirt or corrosion, thereby assuring better control performance and longer control life. Complete catalog sent upon request.

MADE BY THE MERCOID CORPORATION 4221 BELMONT AVE. CHICAGO 41, ILL.

Mercoid Controls are first choice among leading engineers throughout industry. They are used on industrial applications involving the control of temperature and pressure. Available in various ranges. Controls also for liquid level, etc.

within this period, the flour may be disposed of at the miller's option.

The order remains in effect until revoked or changed by amendment.

Fats and Oils Supply Causes Cut in Quotas

BECAUSE of seasonal production declines, allocation of edible fats and oils, including lard, margarine, shortening and other oils, will be reduced in the third quarter. Civilian allocations will be about 11 percent smaller, or from 997,100,000 lb. in the second quarter to 884,500,000 lb. The military allocation totals 12,300,000 lb., compared with the second quarter's 12,500,000.

The total allocable supply of edible fats and oils during the third quarter is 1,035,200,000 lb., down from 1,254,200,000 lb. in the second quarter. Most of this reduction is in the supply of lard, reflecting the usual seasonal decline.

Frozen and Dried Eggs

THE Department of Agriculture announced the additional purchase, last month, of 2,583,000 lb. of dried eggs and 3,562,000 lb. of frozen eggs, all for export.

The dried egg purchase brought to more than 70,000,000 lb. the quantity already bought under a procurement program of 76,500,000 lb.

SCHEDULE OF EVENTS

AUGUST

12-15—International Apple Association, 52nd annual convention, Hotel Sherman, Chicago.
24—Food Distributors Association, convention and exposition, Hotel Sherman, Chicago.

SEPTEMBER

9-11—National Coffee Association, annual convention, Edgewater Beach Hotel, Chicago.
9-13—American Chemical Society, 110th national meeting and national chemical exposition, Coliseum, Chicago.
12-13—Cornell University, 2nd annual dairy industry conference, Ithaca, N. Y.
15-18—Southern Bakers Association, annual convention, Edgewater Gulf Hotel, Edgewater Park, Miss.
16-20—Instrument Society of America, first national conference and exhibit, William Penn Hotel, Pittsburgh.

OCTOBER

12-17—Master Brewers Association of America, 40th annual convention and 3rd brewing and equipment exposition, Navy Pier, Chicago.
13—American Bakers Association, Hotel Sherman, Chicago.
14-18—American Dietetic Association, 28th annual meeting, Netherlands Plaza, Cincinnati, Ohio.
21-26—Dairy Industries Supply Association, 15th exposition, Atlantic City, N. J.
21-23—International Association of Milk Dealers, convention, Atlantic City, N. J.
24-26—International Association of Ice Cream Manufacturers, convention, Atlantic City, N. J.
23-25—National Bakers Supply House Association, annual fall convention, St. Francis Hotel, San Francisco.
29-Nov. 1—Refrigeration Equipment Manufacturers Association, 4th all-industry refrigeration and air conditioning exposition, Public Auditorium, Cleveland.

CASE HISTORY No. 7

One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON

	50 lb. Open Mouth Burlap Bags	50 lb. Multiwall Paper Valve Bags
Bag cost per M	$129.55	$86.80
Bag cost per 50 lbs.	.129	.086
Labor cost per 50 lbs.	.013	.007
Total bag and labor cost per 50 lbs.	.142	.093
Saving per bag paper over burlap		.049
Saving per ton paper over burlap		1.96

DETAILS OF LABOR COSTS

	Production per Hour	Cost per 50 lbs.
Burlap bags		
1 man filling, weighing, closing and handling at 80¢ per hour	3000 lbs.	.013
Multiwall Paper Valve Bags		
1 man filling and handling at 80¢ per hour	6000 lbs.	.007

CLASS OF PRODUCT PACKED

CEMENT	FERTILIZER
CHEMICALS	FOOD ✔
FEEDSTUFFS	MISCELLANEOUS

PRODUCT CHARACTERISTICS

ABRASIVE	GRANULAR
CORROSIVE	HEAVY
DELIQUESCENT	HYGROSCOPIC
FLUFFY	LIGHT ✔
FREE-FLOWING ✔	VISCOUS

ST. REGIS BAG PACKAGING SYSTEMS are made in a variety of capacities, speeds, and manpower requirements to suit specific products and plant layouts. Machines are available in types to meet the special characteristics of a wide range of products, with filling speeds as high as twenty-four 100-lb. bags per minute — with one operator.

Changes in Food Supplies

(Indicators)

Production

Creamery butter production in May, estimated at 113,695,000 lb., was 29 percent lower than in May, 1945 and 41 percent below the May average over the 1940-45 five year period. The seasonal gain from April was 25 percent compared with 31 percent last year and 30 percent for the average April to May increase over the same five year period.

American cheese production in May totaled 91,680,000 lb., which was 15 percent below the May output in 1945, but was 1 percent above the 1940-44 average.

Ice cream production for the first three months of this year is estimated at 133,150,000 gal., which compares with 68,125,000 gal. for the first 1945 quarter and an average of 60,926,000 gal. for the first quarter of the 1940-45 period.

Flour production in June totaled 10,168,999 sacks, a decrease of 741,183 sacks from the previous month, in the compilation made by the Northwestern Miller from approximately 71 percent of the total mills. In June, 1945 these mills produced 15,950,746 sacks. Durum production in June, representing approximately 99 percent of the U. S. total came to 629,915 sacks of durum products, a decrease of 240,870 sacks under June, 1945 and a drop of 154,068 sacks under May, 1946.

Tuna packed during the first five months of 1946 totaled 1,242,485 cases, the largest production for the period in the history of the industry. As a result of this performance, a total pack of about 5,000,000 cases is predicted for the year. The pack totaled 4,237,000 cases in 1945.

Canned evaporated milk production during May came to 377,600,000 lb., 20 percent less than a year earlier, but 2 percent more than the May average for 1940-44.

Sweetened condensed milk production was 12,650,000 lb. in May, a decline of 21 percent from May 1945. The seasonal gain from April to May, however, was considerably greater than usual.

Dry whole milk production was estimated at 23,225,000 lb. in May, 14 percent less than in May, 1945, but 152 percent above the 1940-44 average for the month.

The Hawaiian pineapple pack came to 9,050,000 actual cases in 1945-46, according to the compilation made by the Pineapple Growers Association of Hawaii. Total juice production for the same pack was 8,671.204 actual cases.

The canned salmon pack of Alaska was reported, in mid-July, to be 28 percent behind the corresponding period last year, the pack to date indicating 472,878 cases compared with 656,573 cases last year.

Materials

The wheat goal for next year's crop has been set at 71,700,000 seeded acres by USDA. This would be the largest acreage since 1938, though it is only slightly over the 71,057,000 acres seeded this year. Even if yields were to fall to the 1935-44 average of 13 bu. per acre, this acreage would produce a crop of 934,000,000 bu.

Lard rendered in May came to 121,032,000 lb., which compared with April production of 108,998,000 lb.

Green peas for processing, including freezing, were indicated on June 15 to be 469,330 tons, which is 6 percent below the 1945 production, but 50 percent above the 10 year average for the period 1936-45.

Cucumbers for pickles, planted this year, cover 139,260 acres, a 16 percent increase over the 1945 acreage and 36 percent above the recent 10 year average.

Snap bean acreage for 1946 processing is about 5 percent less than the 1945 planting. This year's total of 130,560, however, is considerably above the 1936-45 year average of 94,990 acres.

Indexes

Business Week's index on business activity rose to 177.1 for the week ending July 16, as against 162.0 a month ago and 217.1 a year ago.

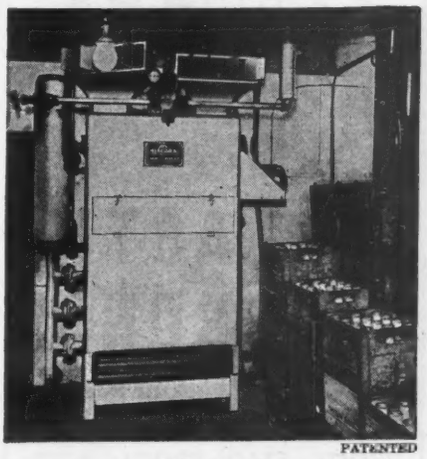
Wholesale price of foods in the New York Journal of Commerce compilation was 134.1 for the week ending July 12. It was 135.5 a week earlier and 109.9 for the month of July, 1945.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded July (thousands)	Total Awarded 1946 (thousands)
Bakery	$ 1,765	$ 425	$ 3,964
Beverages	266	1,068	20,806
Canning and Preserving	1,180	...	5,788
Cold Storage	2,856	...	6,336
Confectionery	725	...	1,715
Grain Mill Products	950	...	9,777
Ice, Manufacturing	...	...	960
Meats and Meat Products	1,352	300	1,724
Milk Products	327	175	1,286
Miscellaneous	1,27	916	12,688
	$10,748	$2,879	$71,044

NIAGARA

"No Frost" METHOD of Refrigeration

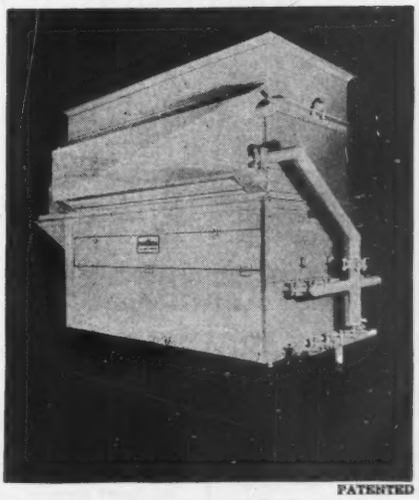


PATENTED

Increases refrigeration capacity from existing compressors — saves power—saves maintenance trouble and attention—increases plant production and earnings. With the "NO FROST" Method you always have full capacity with never any refrigeration loss from frosted coils.

Write for Bulletins 83 and 95.

NIAGARA Duo-Pass AERO CONDENSER



PATENTED

has saved refrigeration users as much as 35% of the power consumed to operate compressors, has increased plant capacity and saved 95% of condenser water costs. The patented NIAGARA DUO-PASS reduces condensing temperatures, prevents loss of capacity from scale on condenser tubes.

Write for Bulletin 91

NIAGARA BLOWER COMPANY

"30 Years of Service in Industrial Air Engineering"

Dept. F. I. 86, 6 E. 45th St., New York 17, N. Y.

Field Engineering Offices in Principal Cities

NIAGARA

AIR ENGINEERING EQUIPMENT

Basco-TEX

PLASTIC APRONS!

Will Not Crack or Peel

WATER-PROOF, ALKALI-PROOF, STAIN-PROOF, ACID-RESISTANT, OIL-RESISTANT

NO LAUNDERING
Save their cost over and over again!

TOPMOST PROTECTION
Far greater safeguard to clothing than ordinary aprons!

AMAZING STRENGTH
Plus lightness in weight for utmost wearing comfort.

6 COLORS — 4 SIZES
PRICES — SIZES — COLORS

WHITE—Light Weight
27 x 36..$ 6.88 per doz.
30 x 36.. 7.85 per doz.
36 x 40.. 9.35 per doz.
36 x 44.. 10.18 per doz.
Full Length Sleeves
$7.15 per doz. pair

BLACK—Light Weight
30 x 36.. 9.78 per doz.
30 x 36.. 9.75 per doz.
36 x 40.. 11.90 per doz.
36 x 44 . 12.60 per doz.
Full Length Sleeves
$9.66 per doz. pair
Leggings Hip Length
$11.90 per dozen pair

GRAY—Medium Weight
27 x 36 .$ 8.40 per doz.
30 x 36.. 9.78 per doz.
36 x 40.. 11.90 per doz.
36 x 44.. 12.60 per doz.
Full Length Sleeves
$9.66 per doz. pairo
Leggings. Hip Length
$11.90 per doz. pair

MAROON—Heavy Double Coated Neoprene
27 x 36..$10.61 per doz.
30 x 36.. 12.60 per doz.
36 x 40.. 16.50 per doz.
36 x 44.. 18.74 per doz.
Full Length Sleeves
$12.90 per doz. pair
Leggings. Hip Length
$23.50 per doz. pair

BLACK—Heavy Double Coated Neoprene
27 x 36..$10.61 per doz.
30 x 36.. 12.60 per doz.
36 x 40.. 16.50 per doz.
27 x 36..$ 8.40 per doz.
Full Length Sleeves
$12.90 per doz. pair
Leggings Hip Length
$23.50 per doz. pair

WHITE—Extra Heavy 20 Mill Plastic
27 x 36..$12.90 per doz.
30 x 36.. 14.00 per doz.
36 x 40 . 18.22 per doz.
36 x 45.. 20.50 per doz.
Full Length Sleeves
$12.90 per doz. pair
Leggings. Hip Length
$23.50 per doz. pair

ALL PRICES F.O.B. Chicago.
Minimum order 1 dozen.

ORDER BY MAIL OR PHONE TODAY

Free Sample Swatch on Request

ASSOCIATED BAG & APRON CO.
218 West Ontario St., Chicago 10, Ill.
Phone SUPerior 5809

What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

ACTS OF VIOLENCE—The first important labor control legislation enacted in 15 years is the Hobbs Act, which is intended to curb acts of violence affecting interstate movement of goods. President Truman signed this with the understanding that the bill "is not intended to deprive labor of any of its recognized rights, including the right to strike and to picket and to take other legitimate and peaceful concerted action." Despite this disclaimer, Washington believes generally that the heyday of unrestrained and irresponsible labor-union leadership is waning. But most Washington observers still feel that the Administration represents a strong "labor" government.

A PROPER PATENT POOL—Use of patents and cross licensing through patent pools have been severely criticized by official Washington as a violation of the antitrust laws. That drastic view long fostered at the Capital City suffered a severe set-back in a three-judge decision affecting gypsum products companies. The appellate court made it clear that it did not regard as "sham" or "subterfuge" the patent license that had been granted to other companies by the largest firm making gypsum products, U. S. Gypsum Company. The very fact that the large company allowed its own small competitors to use its patents was apparently one of the important arguments refuting the monopoly charges of the Department of Justice in this case. An appeal to the Supreme Court may be taken. Meantime it looks as though direct and considerate patent pools and licensing are proper.

SCARCE CORN STARCH — Official Washington is arranging that corn be channeled to wet grinders so that industries other than food processing be not hindered unduly by lack of industrial starch. Civilian Production Administration expresses serious concern over the scarcity of starch for core binders, textile finishing, paper finishing, and a variety of other industrial applications. Most of the official interpretation is technically sound, but one reading as a food technologist is amused to know that "corn steep liquor is a raw material ingredient of penicillin." The spirit is willing but the technology is sometimes weak in many of these difficult cases. One wonders how many queer decisions have come from lack of knowledge rather than lack of willingness to help distressed industry in these days of serious goods shortage for many purposes.

CENSUS DELAYED—There will be no census of manufactures or census of business in 1947 for review of 1946 operations. Congress decided not to give Bureau of the Census the expected $15,000,000 needed for these purposes. Thus, the food industries and others must continue another year without comprehensive statistics of business which would help very much in business planning. The nominal reason given by critical legislators was that the law provides for such inquiries in relation to odd-numbered years, and obviously 1946 is an even number. But under the surface there can clearly be seen a feeling on the part of many Congressmen that they do not want Henry Wallace, as Secretary of Commerce, to have any money for his department that they can gracefully decline to give him.

KEEP THOSE RECORDS! — Those who have been required to keep records under OPA regulation must still preserve them at least until July 1, 1947. Reduction of OPA authority does not remove the right of investigation. Prosecution will not stop.

BAKERY SHIFT SOUGHT—Unofficially, Washington admits that curtailment of sugar supply for bakeries was intended to shift limited flour supplies and other scarce materials from cake to bread. Unquestionably official Washington believes, whether true or not, that the public needs more bread rather than a continuance of present sweet baked-goods supply. The whole bakery problem, as well as the rest of the sugar-using business of the country, is

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likely to be involved in similar difficulties for at least another year. The forecasts of world sugar and edible fat supply continue to be very disappointing. Not the least of the causes of prospective scarcity is the inability of Netherland Indies areas to resume production before the political controversies there are settled. Whether the end of the controversy will be a recognition of the Indonesian Republic or not, there must be some elimination of fighting and disturbed business relations before a normal food supply of the world can be aided from these important producing areas. No one in Washington will even attempt to guess as to when peace can be expected there.

DRAFT STILL HURTS—Under a volunteer plan of the Army, men will not be drafted until at least September 1. But thereafter the draft will hit all non-fathers eligible for service almost without any chance for industrial deferments. Managements needing to hold some men must make plans now.

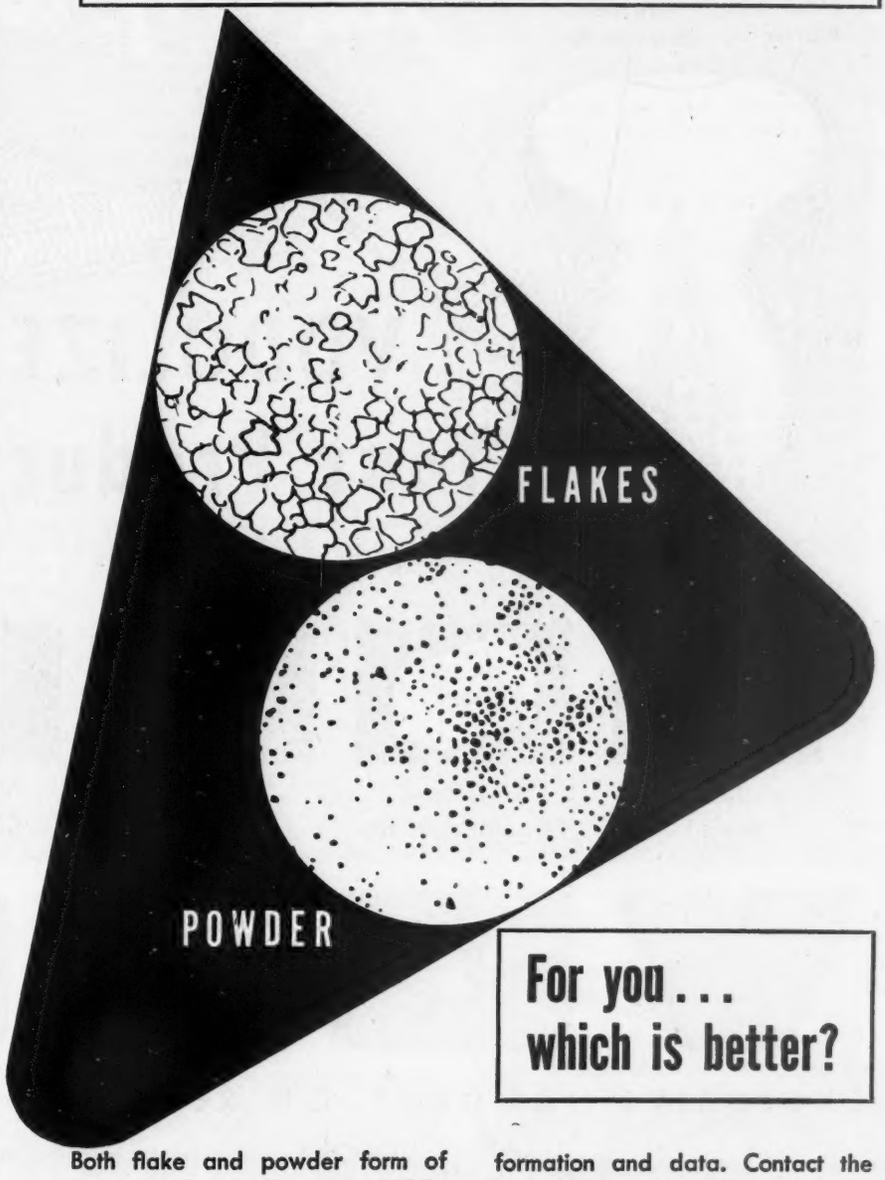
WHAT IS "NUTRIENT X"?—"Nutrient X" is the temporary name given to palatability factor in foods by Department of Agriculture investigators. Apparently this obscure component is essential along with protein in order to maintain animal appetite. Despite much "kidding" of officials, this new essential food component is taken quite seriously by nutritionists about Washington.

FREIGHT RATES UP—Interstate Commerce Commission has not waited for review of the general freight rate case, which originated in the railroads' request for a 25 percent increase. It has already granted a general 6 percent increase on most goods. That is only one step toward expected larger freight increases.

NO TIE-IN ALLOWED—The U. S. Supreme Court has refused to review the case of a fruit and vegetable wholesaler who had been found guilty in lower courts of tie-in sales. Thus, OPA got almost blanket support for the philosophy that marketing restrictions must not be evaded by dealers through requirement of purchases of certain goods in order to get others really wanted. It is expected that this court ruling will greatly encourage conservative dealers who have at times been badly bothered by less scrupulous competitors who monopolized markets by tie-in methods.

QUICK FLOCK ADJUSTMENT—Poultry dealers are getting large numbers of birds from growers who are heavily culling flocks because of shortage of feed. Official Washington estimates that chicken flocks dropped 40,000,000 birds recently for this cause alone. Those dependent on poultry for raw material are expected to be the earliest, of any groups of industry, to feel the short meat supply. Cutbacks in herds of cattle, sheep, and other large animals are also expected, but not nearly as quickly.

Monsanto Sodium Benzoate, U.S.P.



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INDUSTRY

Alta Vineyards Co., Dinuba, Calif., recently was destroyed by an explosion and fire. Loss is estimated at more than $600,000. Joseph Gentile, president, announced that reconstruction will be started as soon as materials are obtained.

American Food Laboratories, Brooklyn, N. Y., manufacturer and distributor of flavors, extracts and stabilizers for the confectionery and ice cream trade, has opened a branch office in Chicago.

E. H. Borchardt Co., Belle Glade, Fla., is expanding its fresh vegetable business into the quick freezing and canning field. The company has acquired, through affiliates, the property of the Belle Glade Canning Co. plant and is building an addition to freeze 3,000,000 lb. of vegetables during the 1946-47 season. E. H. Borchardt is president and general manager.

Campbell Soup Co., Camden, N. J., has announced the election of James McGowan, Jr., as vice-president in charge of research and development. John M. Hoerle, former production manager, becomes vice-president in charge of production.

Canada Dry Ginger Ale Co., Berkeley, Calif., will double its present plant size and capacity with a $150,000 one-story addition now under construction.

General Mills, Inc., will spend more than $25,000 for alterations to its food processing plant in Rossford, Ohio.

Grapette Bottling Co., Camden, Ark., has announced its intention to locate a plant in Salem, Ore. Partners in the Salem company will be Ralph Atwood, Lt. Col. H. H. Northington and Sgt. Norris Northington.

International Minerals & Chemical Corp. has acquired a half interest in the recently formed Wheat Products Co., Jefferson City, Mo., and has contracted for that company's entire output of wheat gluten. The new firm has begun construction of a $1,000,000 plant at Jefferson City, to be ready for operation this fall.

Lever Bros. Co., Cambridge, Mass., has announced plans for the expansion of its plant in Hammond, Ind., where edible oils are processed into shortenings.

Louis Milani Foods, Inc., Chicago, has announced the appointment of James G. Danley as executive chef. Mr. Danley will be in charge of the entire line of Milani institutional products.

Midwest Popcorn Co., Valley, Nebr., was destroyed by fire on July 5 with a reported loss of $250,000 in buildings, equipment and popcorn.

Paul-Lewis Laboratories, Inc., Milwaukee, is sponsoring a scholarship in brewing at the Wahl-Henius Institute, Chicago. The purpose of the scholarship is to encourage capable young men who might not be financially able to study the art and science of brewing. Selection of the candidates will be made by a committee of the Master Brewers Association of America.

A. E. Staley Mfg. Co., Decatur, Ill., has begun work on a new pilot plant, which will be used to follow up research laboratory operations with actual tests in manufacturing new food products from corn and soy beans.

The South Berkeley Creamery, Berkeley, Calif., is planning construction of a new $300,000 plant. The two-story building is designed to handle up to 10,000 gal. of milk daily.

S. and W. Fine Foods Co., San Francisco, has plans under way for a $2,200,000 expansion program in plant and warehouse facilities.

Taylor - Reed Corp., Mamaroneck, N. Y., has announced the erection in the near future of a $300,000 plant at Glenbrook, Conn. The structure is expected to be completed by the summer of 1947.

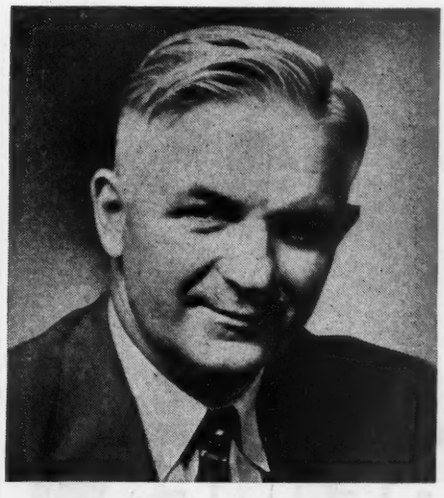
Van Camp Packing Co., Astoria, Ore., is planning year-round operation of its tuna packing plant. This will be made possible by the importation of fifteen tons of tuna a month from Costa Rica.

PERSONNEL

Orval H. Ause, manager of the butter department, H. C. Christians Co., Chicago, recently was elected to the board of directors and appointed assistant manager of the Chicago office.

C. E. Beardslee, The Borden Co., New York, was elected chairman of the American Dry Milk Institute, Inc. H. R. Leonard, Twin City Milk Producers Association, St. Paul, Minn., was

DR. E. C. THOMPSON



MARTIN M. KLOSER

DR. A. H. JOHNSON

For "outstanding contribution and meritorious achievement in the field of dry milk production, distribution and research," the American Dry Milk Institute, Inc., has presented the C. E. Gray Award to Dr. E. C. Thompson, The Borden Co., New York, chairman of the standards committee, and his two co-workers, Dr. Arnold H. Johnson, Sealtest Laboratories, Baltimore, and Martin M. Kloser, Bowman Dairy Co., Chicago. The award is given in honor of the late C. E. Gray, for 19 years chairman of the Institute.

AREA OF LEAK	AIR		STEAM		WATER	
Diameter Inches	Number of cubic feet per month at 75 lb. pressure	Total cost of waste per month 11c per 1000 cubic feet	Pounds wasted per month at 160 lb. pressure	Total cost of waste per month 65c per 1000 lb.	Gallons wasted per month at 60 lb. pressure	Total cost of waste per month 16c per 1000 gallons
1/2"	13,468,000	$1,481.44	1,219,280	$792.53	1,524,100	$243.86
3/8"	7,558,500	831.44	684,290	444.79	855,360	136.86
1/4"	3,366,990	370.37	304,820	198.13	381,020	60.96
1/8"	824,570	90.70	74,650	48.52	93,310	14.93
1/16"	213,000	23.43	19,280	12.53	24,110	3.86
1/32"	52,910	5.82	4,790	3.11	5,990	.96

What does it cost you each month *for air, steam, water, you never use?*

Fig. 1640 "King Clip" Gate

Maybe you've never checked the actual cost of valve leakage. If you haven't, you'll doubtless be startled at these figures.

A single valve leak the size of a pinhead can waste enough air in a month to approximate the cost of a new valve. Steam leaks . . . water leaks . . . also take a heavy toll if neglected . . . not to mention the wastage of such a critical item as fuel.

Where Lunkenheimer Valves are given ordinary care, such losses are held to an absolute minimum. These quality-built valves are designed to give extra long service with the lowest possible outlay of time, labor, and money, for maintenance. Enlarged copies of the above chart for posting in your plant are available on request. Also available are the services of your nearby Lunkenheimer Distributor, who is fully equipped to assist in solution of your operating or maintenance problems.

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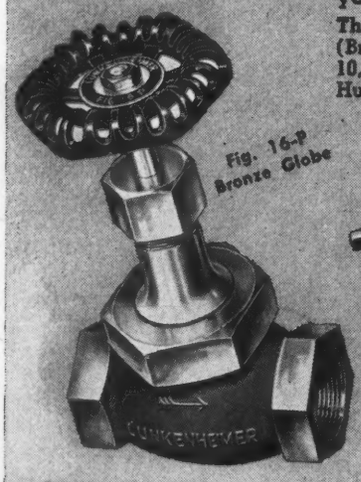

Fig. 16-P Bronze Globe

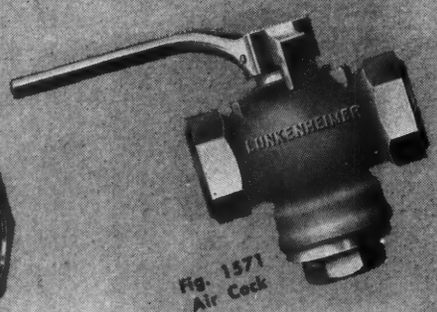

Fig. 1571 Air Cock

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BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S.P.; BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS

DR. CLAUDE S. HUDSON

At the 110th national meeting of the American Chemical Society in Chicago, September 9-13, Dr. Claude S. Hudson, director of the division of chemistry, National Institute of Health, Bethesda, Md., will be honored for his contributions to the knowledge of carbohydrates.

elected vice-chairman and M. J. Metzger, Bowman Dairy Co., Chicago, secretary-treasurer. Members of the executive committee include E. A. Pool, Dairymen's League Coop Association, New York; C. M. Peterson, Kraft Foods Co., Minneapolis; M. M. Boney, Whatcom County Dairymen's Association, Bellingham, Wash., and Paul Young, Golden State Co., Ltd., Chicago.

Frank E. Brewer has resigned the presidency of the Marshall Canning Co., Marshalltown, Iowa. His retirement follows nearly half a century devoted to the development of the firm.

Earl F. Cross, division operations manager for the central division of General Mills, with headquarters in Chicago, has been appointed a division vice-president, according to an announcement recently made by Harry A. Bullis, company president.

Gerald S. Doolin has been appointed sanitary director of the National Confectioner's Association. Mr. Doolin will work directly with the Sanitary Standards Committee, of which Charles F. Scully, Williamson Candy Co., is chairman.

Dr. Charles N. Frey, Scarsdale, N. Y., director of scientific relations for Standard Brands, Inc., New York, recently received the honorary degree of Doctor of Science from Michigan State College.

A. G. Harmeier, vice-president in charge of manufacturing of the Sprague-Warner division of Consolidated Grocers, Chicago, has resigned to become a consultant on food manufacturing and packing.

Otto Hevrdejs, formerly with Owens-Illinois Glass Co., and Continental Can Co., recently joined Ben Gee Products,

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Original belts on the two-color presses of one of the country's largest printing plants started and stopped the presses with an abrupt shock... slipped frequently, causing uneven operation. Result was excessive wear on press parts and motor armature, requiring frequent repair. Moreover, belts broke frequently, causing complete shutdowns, loss of production and sometimes missed deadlines. Troubled, management tried Dayton V-Belts. Now power is delivered evenly, presses start and stop smoothly, belt slippage has been eliminated... maintenance costs have been reduced... production has been stepped up. Dayton V-Belts transmit power smoothly and positively because the *engineered* resilience of Dayton V-Belts, and the seating action of the belts in the pulley grooves, absorb the shocks of suddenly applied power. Their scientific design and construction is the result of over 40 years of research and manufacturing experience working with natural and synthetic rubber. It is experience that can help you solve your power transmission drive problems. For full information write The Dayton Rubber Manufacturing Company, Dayton 1, Ohio.

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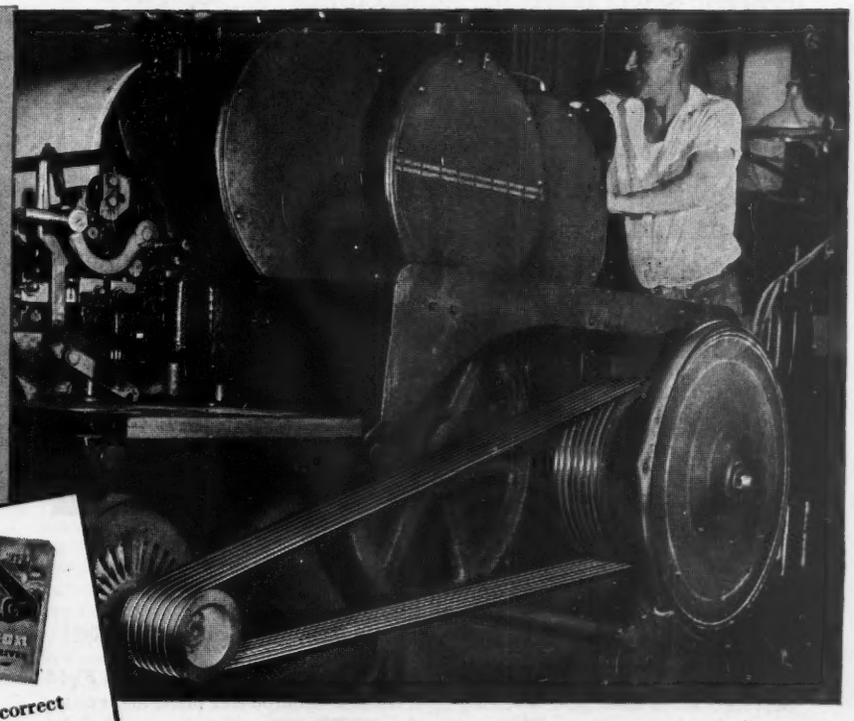
POWER TRANSMISSION ENGINEERS:

There is a mill supply house near you that stocks Dayton V-Belts. A representative will gladly discuss your power transmission drive problems with you. Look for the name under the trade name heading "Dayton V-Belts" in the yellow pages of your telephone book.



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You can count on

OAKITE CLEANING

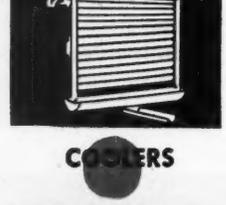
to help protect product purity!

MILK CANS

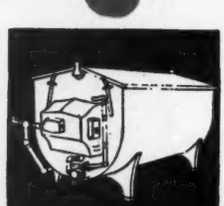
Your choice of detergent and method of application for sanitizing your milk and food processing and handling equipment can importantly influence the quality of your product. Using a material not specifically designed for the job or applying a suitable material incorrectly will boost bacteria counts and jeopardize product quality.

COOLERS

Specially-designed Oakite cleaning compounds can help you to safeguard your product quality through their proved ability to remove completely every trace of bacteria-harboring milk or food residue. Oakite Techniques, tailored to fit your individual requirements, can help you to expedite your daily clean-up practices . . . put them on an efficient, low-cost basis.



PASTEURIZERS



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MAJ. WALTER A. MACLINN

Formerly on duty at the Quartermaster Food and Container Institute, Chicago, Maj. Walter A. Maclinn will become head of the department of food technology at Rutgers University, New Brunswick, N. J., when the fall term opens in September.

Inc., Chicago, as production manager. Ben Gee previously has been packing only in glass and now has added a canning line. Bernard J. McKernan heads the new bacteriological and chemical control laboratory for the company.

Dr. W. A. Kutsch has been elected a vice-president of the A. E. Staley Mfg. Co., Decatur, Ill., with the title of vice-president in charge of production. He has been general superintendent of the Staley Co. since 1928 and has served as a member of the board of directors since 1935.

Leonard A. Zerull has been named superintendent of the General Mills Purity Oats plant in Keokuk, Iowa, according to an announcement by Clarence M. Hidding, president of the company's Purity Oats Division. Zerull joined General Mills in 1936 and served consecutively at the Kansas City, Louisville and Wichita Mills. He recently has been discharged from the Army.

DEATHS

William A. Bartshe, 69, vice-president of United Milk Products Co., Hillsdale, Mich., June 24.

Wade O. Caswell, 63, general manager of Pet Milk Co. plant in Bryan, Ohio, June 8.

Jacob Kunz, 85, president, Minneapolis Brewing Co., Minneapolis, June 24.

Omar E. Mueller, 66, chairman of the board, Cleveland Home Brewing Co., Cleveland, Ohio, June 22.

James W. Parks, 68, Alaska pioneer who established the Western Fishery

Co. and operated the Parks Canning Co. at Kodiak, July 4, in Seattle.

Grover C. Patton, president of Purity Baking Co., Decatur, Ill., and a director of the American Institute of Baking, June 13.

Abbot W. Sherwood, former vice-president of Owens-Illinois Glass Co., Toledo, Ohio, May 30, at Dover, N. H.

ASSOCIATED INDUSTRIES

Brown Instrument Co., Philadelphia, has announced the appointment of J. W. Weingartner as production control manager. He has been with the industrial division of Minneapolis-Honeywell Regulator Co. for the past 22 years. Charles Goodman has taken over the duties of purchasing agent under Mr. Weingartner's supervision and William Lawson has been named assistant production control manager.

The Liquid Carbonic Corp., Chicago, has appointed George T. Jahnke director of advertising, according to an announcement by P. F. Lavedan, president.

Pacific Can Co., San Francisco, has acquired property in Sacramento's industrial area on which it is planned to build a $100,000 can manufacturing plant as soon as labor and materials are available. Spur tracks will be built by Western Pacific Railroad to serve the facilities.

Packaging Institute, Inc., New York, has announced the election of J. H. Gilluley to the board of directors of the Institute. Mr. Gilluley is advertising and sales promotion director of Anchor Hocking Glass Corp.

The Shipping Container Institute has announced the appointment of Theodore J. Gross as managing director. Mr. Gross, for some time affiliated with the Container Testing Laboratories, New York and Chicago, recently resigned as president of that organization. He will make his new headquarters at the Institute's offices in New York. The Shipping Container Institute was formed recently by a number of fiber box manufacturers to provide a technical information center and to conduct fundamental research in the field of fiber shipping containers.

C. A. Swanson and Sons, Inc., Omaha, has made known the appointment of Crawford Pollock as sales promotion manager.

The Water Soluble Gum Association of America, Inc., recently elected the following officers: E. A. Wieland, president; H. A. Wittridge, vice-president; P. A. Dunkel, treasurer; and R. L. Zeno, secretary.

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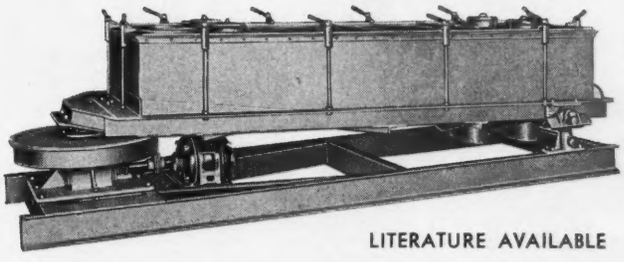
PROCESSING UNIQUE EQUIPMENT

GYRO-SIFTERS

Made in Various Types and Sizes



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ACCURACY IN TESTING DEHYDRATED FOODS *for Moisture*

The STEINLITE 40 gram One Minute Moisture Tester

The STEINLITE electronic moisture tester is accurate for four reasons: (1) It is checked and calibrated against official oven methods. (2) It is designed and built by an organization of electrical engineers—pioneers in the radio field. (3) Materials are the finest obtainable — workmanship by skilled craftsmen — inspection rigid. (4) The Steinlite is about as easy to operate as a radio. No previous experience necessary to get accurate readings.

The Steinlite is a production control instrument and not a laboratory instrument alone.

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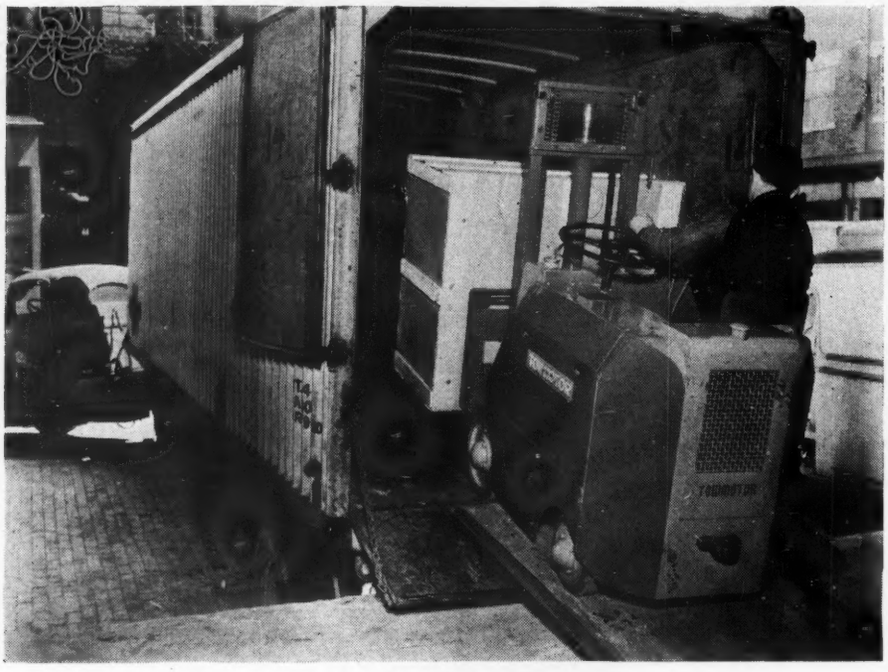
FOOD EQUIPMENT NEWS



Side-mounted motor lift truck.

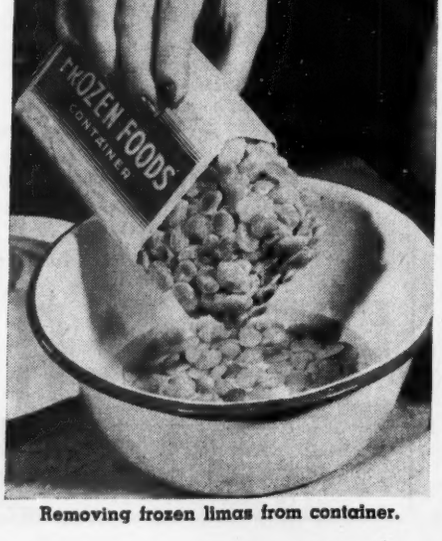
Compact Lift Truck

A COMPACT, side-mounted motor lift truck, Model LT-35, is the newest addition to its line by Towmotor Corp., Dept. I, 1226 E. 152nd St., Cleveland 10, Ohio. Placement of the motor on the side reduces overall length without sacrifice of strength. Lifting and tilting mechanisms are hydraulic. It weighs only 2,800 lb. and will lift, carry and stack a 1,500- to 2,000-lb. load. It is particularly adaptable for operation in previously inaccessible areas such as tight aisles, elevators and the crowded confines of highway trucks and freight cars.

Frozen Food Container

A MOISTURE and liquid leakage proof frozen food container with metal ends and of semi-rigid construction is announced by American Can Co., Dept. I, 230 Park Ave., New York City. Experimental packs were tried last summer. The container is an oblong, composite fiber-metal package resembling the conventional frozen-food carton in shape. The walls, however, are made of paraffin-impregnated fiber, and the ends are of light weight metal. Adapted to high speed closing machines handling up to 200 per minute, this container entirely eliminates the inner seal bag or outer wrap in packaging frozen foods. No setting up is required. The packages in freezing do not stick together or to the freezing coils.

This package is complete in itself and is printed at the point of manufacture in any two colors chosen from a large variety, eliminating the need of labeling. The container is adaptable for use in all present types of freezing equipment and is made in five different sizes. To open, lift either end with an ordinary hook-type opener.



Removing frozen limas from container.

More than 50,000,000 of these containers are expected to be provided to packers this season.

Cartridge Snubber

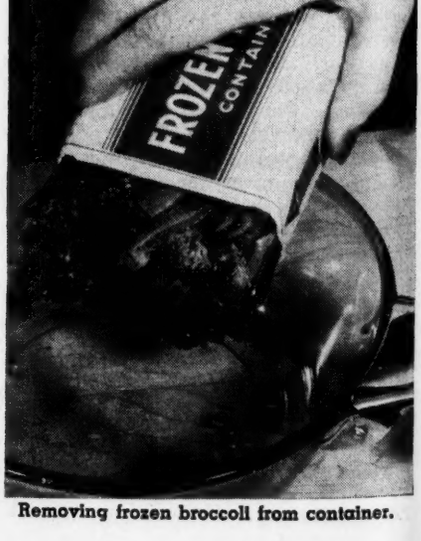
AMERICAN CHAIN AND CABLE CO., INC., Dept. I, Bridgeport, Conn., announces the development of a snubber, or pulsation dampener, in which is used a powdered metal through which the pressure medium must pass. The compressed powdered metal is in the form of a cartridge, which can be inserted directly in the gage socket, or in a small separate connecting piece attached to the gage socket. The compressed powder metal is made in various porosities for air or gas, water or steam, or for oil.

This type of helicoid cartridge snubber is said to have been found effective in reducing or eliminating violent pressure pulsations.

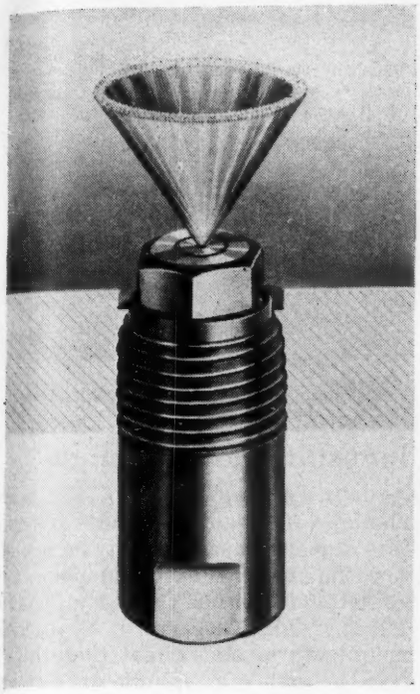
Hydraulic Atomizing Nozzle

A NEW TYPE hydraulic atomizing nozzle that may be mounted directly into the wall of processing or machine equipment is made available by Spraying Systems Co., Dept. I, 4061 W. Lake St., Chicago 24, Ill. It is particularly recommended for such operations as spraying shortening into flour.

The nozzles are made in a variety of materials, including brass and stainless steel. They consist of three



Removing frozen broccoli from container.



Hydraulic atomizing nozzle.

parts: (1) the body, (2) cap with stainless steel orifice insert and (3) body with monel metal screen or strainer. Cap and core assemblies are renewable to minimize nozzle costs. Nozzles are available in 16 sizes and provide efficient operation at pressures ranging from 10 to 1,000 lb. psi.

Water, oil, solvents and liquids with similar viscosities may be sprayed. The spray produced is of a hollow cone-type, with uniform distribution of atomized liquid.

Level Control

PHOTOSWITCH, INC., Dept. I, 77 Broadway, Cambridge 42, Mass. announces a level control, Series 10, available to the chemical, sanitary, sewage and refrigeration fields. These are rugged maintenance-free relays for level control of all electrically conductive liquids. Contact with the liquid is made only by a stainless steel probe rod. There are no floats, bellows seals, or stuffing boxes. With a.c. in the probe circuit, no electrolytic action is possible. Mica insulated probes insure against leakage.

This level control series is recommended for the control of: water, milk, beer, and other acid neutral or basic liquid foods.

The operation of the level control unit depends on the fact that the liquid to be controlled makes or breaks contact with the probe and transmits to the control a minute electrical current at low voltage. Without the use of vacuum tubes, this current controls a power circuit which operates a relay to actuate signals, valves or pumps.

Plastic Insulator

A LIGHT-WEIGHT unoriented multicellular form of cellulose acetate plastic, with thermal insulation properties, used as a core material in sandwich laminates is announced by E. I. du Pont de Nemours & Co., Dept. I, Wilmington 98, Del.

"Cellular Cellulose Acetate" can be used in refrigerated truck bodies and other refrigeration units that need an insulator that has great strength as a structural core material.

Plastic insulator sandwiched between two strips of aluminum. Note gas burner flame under panel and ice on top. Ice is melting only a little faster than at room temperature.

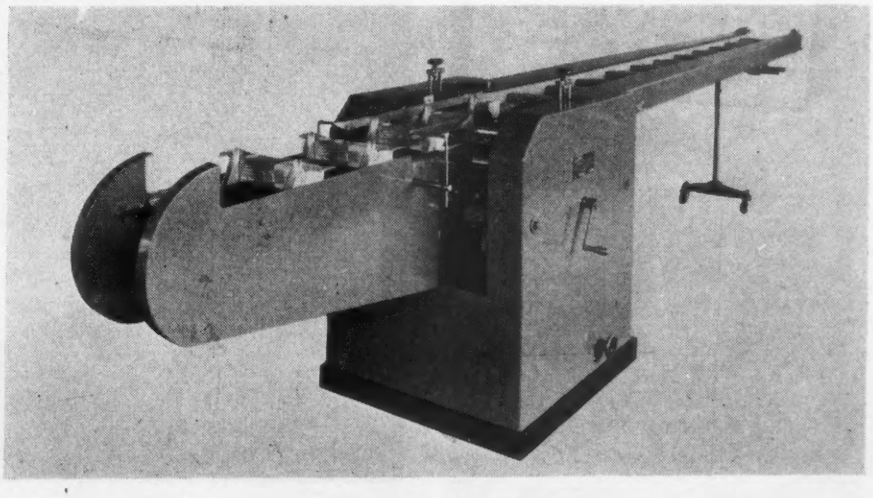
The product is available in the form of extruded boards, of which the length is limited only by that of the container and the method of shipment. The width and thickness are determined by the capacity of the manufacturing equipment and by the nature of the process. The density of the material can be made in ranges from 4 to 9 lb. per cu. ft. It has a relatively sharp softening point within the range of 390 to 400 deg. F. and shaping can be done within this temperature range. Prolonged heating at the shaping temperature will partially decompose the material and heating to a higher temperature than 400 deg. F. will melt it.

Carton Sealer

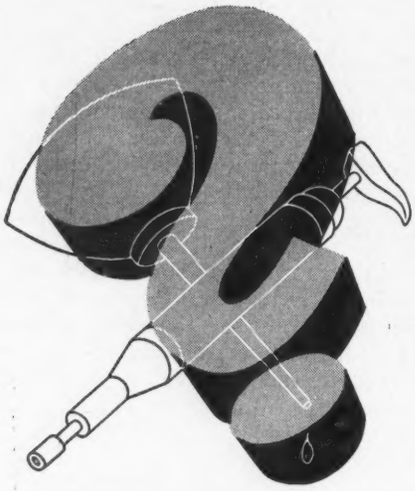
AN improved carton glue-sealing machine that seals simultaneously the tops and bottoms of filled cartons is announced by the Container Equipment Corp., Dept. I, 204 Riverside Ave., Newark 4, N. J. This type of sealer eliminates the need of first sealing the bottoms of cartons, then filling them, and later sending them to a carton sealer for sealing the top. High speeds ranging up to approximately 120 cartons per minute, depending on the size of the carton, may be obtained without any undue wear on the machine. Some of the special features are: (1) Adjusts instantly for different sizes and speeds without tools, (2) produces square, neat, tamper-proof cartons and (3) it is portable, self-contained.

Alkaline-Type Detergent

OAKITE PRODUCTS, INC., Dept. I, 26G Thames St., New York, announces a heavy-duty alkaline-type detergent recently developed for use in connection with industrial steam cleaning. This material, Composition No. 92, is recommended on a wide range of operations. It is spe-



Improved carton sealer.



GREASE OR OIL

The question of selection of the proper type and consistency of lubricants need offer no problem. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest grease types. All reduce friction and wear, protect against rust and corrosion, and are more economical than conventional lubricants. Let us prove our case.

℞ FOR YOUR MACHINERY

No. 3 — Ideal for general oil type lubrication, ring oiled bearings, wick feeds, sight feeds and bottle oilers.

No. 8 — Because of high film strength and long life it reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 107 — One of the most popular grease type products for general application by pressure gun or cups.

No. 70 — For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA — Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING — This is the LUBRIPLATE Lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

LUBRIPLATE

FISKE BROTHERS REFINING CO.

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DEALERS FROM COAST TO COAST

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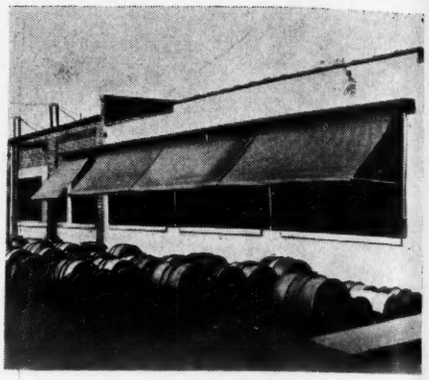
cially designed for use in modern steam guns and coil-type steam generating mechanisms, for cleaning machinery and equipment parts, for preparing equipment surfaces for repainting or refinishing, for cleaning equipment too large for tank immersion or where suitable tanks are not available, paint stripping and other cleaning operations. It is readily soluble in hot water.

Floodlight Unit

A GASOLINE-DRIVEN floodlight unit on skids or on wheels, which provides light and auxiliary power, is announced by Consolidated Diesel Electric Corp., Dept. I, Mt. Vernon, N. Y. It furnishes 120 volts, single phase, and 208 volts, three-phase current to four 1,000 watt adjustable wide-diffusion lamps. It is available with hand- or electric-starting device. Each light is individually protected by circuit breaker, and pyrex lenses are used on all lamps. A sturdy trailer assembly is built to withstand severe shocks. Permanent alignment is insured by specially designed interlocking of generator frame with flywheel housing. Lamps can be individually disconnected for off-unit mounting.

Improved Bottle Washer

DOSTAL AND LOWERY Co., Dept. I Menomonee Falls, Wis., announce an improved soaker and bottle washer that soaks bottles for a longer period of time and washes them with more power. It handles from 4-oz. up to 32-oz. bottles without adjustment. It has "swing out" headers, "pull out" rinsers and totally inclosed variable speed driving mechanism.



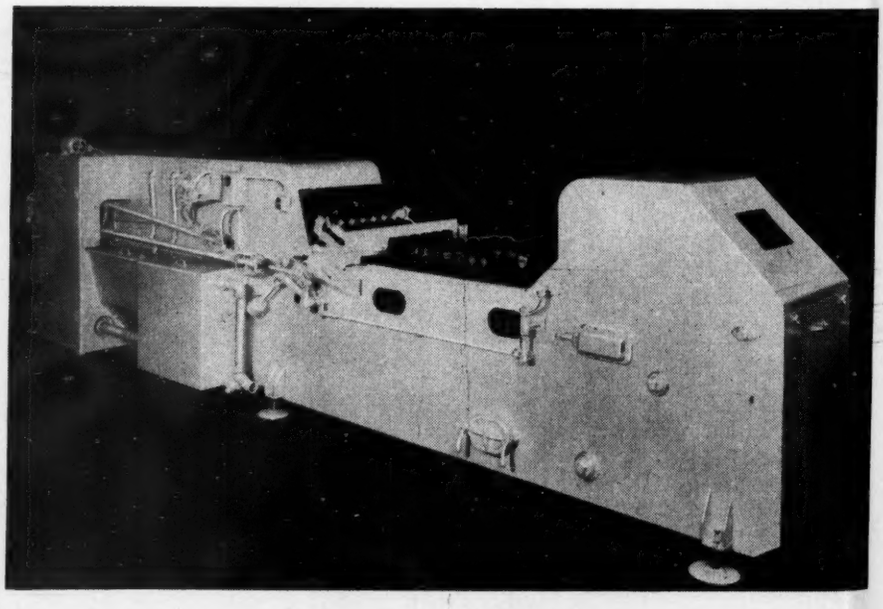
Aluminum awnings for industrial plants.

Industrial Plant Awnings

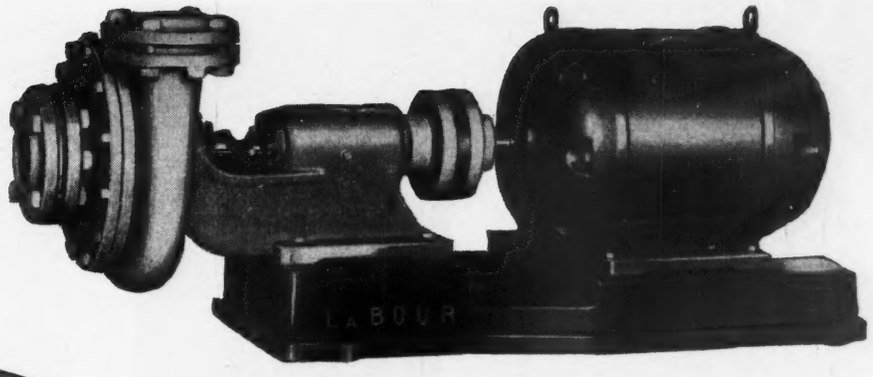
ALUMINUM awnings for industrial plants, which automatically roll up into a neat compact roll at the top of the window, have been announced by Aluminum Awning Co., Dept. I, 479 Meadow Rd., Rutherford, N. J. The manufacturer states that these awnings do not sag, shrink or stretch and are finished in a protective coat of baked aluminum enamel in a range of pleasing colors to harmonize with any plant exterior.

Waterproof Bags

BY varying the number, as well as the kind of laminated materials, waterproof bags are produced to meet a variety of requirements for different products. Bemis Bro. Bag Co., Dept. I, 408 Pine St., St. Louis 2, Mo., states that the usual construction is an outside ply of either cotton or burlap cloth with two or more plies of paper. The paper and the adhesive used for lamination are varied with the different types of uses to which the bags are put. The



Improved bottle washer.



This Pump Can't Suffer from "Middle Age Spread"

When pump efficiency depends upon maintenance of close clearances it isn't long before wear and corrosion produce a condition which can properly be called "middle age spread." As the clearances spread, efficiency drops rapidly, and the pump becomes old before its time.

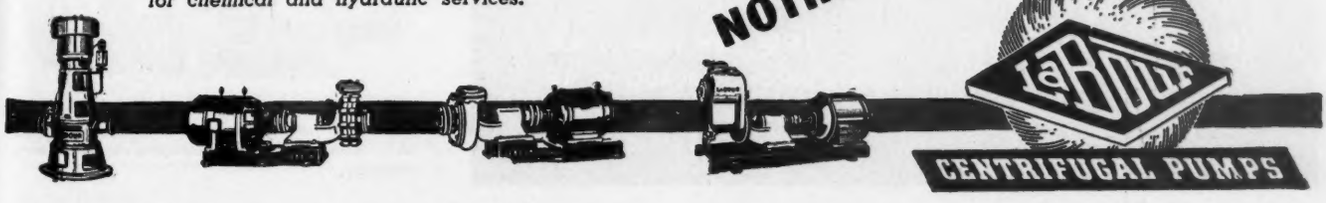
That can't happen to any LaBour pump. It's particularly important in LaBour Type Q, which delivers efficiencies comparable to pumps equipped with sealing rings, yet is an open impeller pump with the usual generous clearances. Consequently LaBour Type Q *retains* its high efficiency. In fact, as much as an extra ⅛" in clearances—and that would ordinarily require a long time by wear or corrosion — still leaves Type Q able to beat all centrifugal records for economical performance.

Whatever your specific need in pumping process liquids, you will find a type of LaBour that does the job in superlative fashion. And when you need a LaBour, nothing else will do.

THE LABOUR COMPANY, Inc.
Elkhart, Indiana, U.S.A.

IF YOU NEED A LABOUR NOTHING ELSE WILL DO

The LaBour line includes a variety of types, both priming and non-priming, for chemical and hydraulic services.

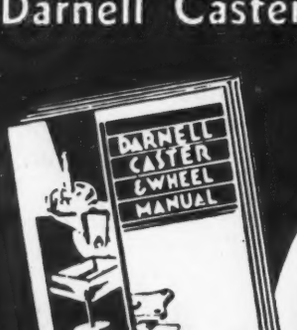


LaBour CENTRIFUGAL PUMPS

YEARS
OF
SATISFACTORY
SERVICE

Darnell Casters
& E-Z ROLL WHEELS

Darnell Double Ball-Bearing Casters and E-Z-Roll wheels reduce floor wear to a minimum, lengthen the life of equipment and increase the efficiency of employees—Write for 192 page Darnell Caster and Wheel Manual.



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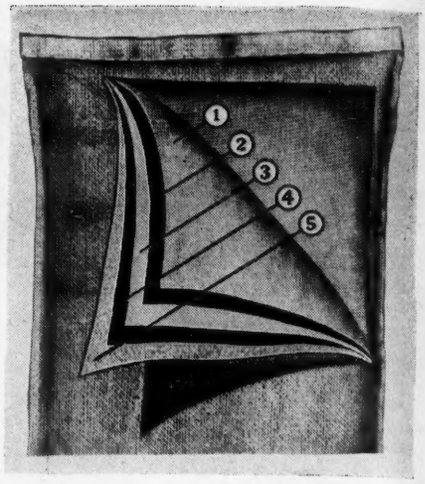


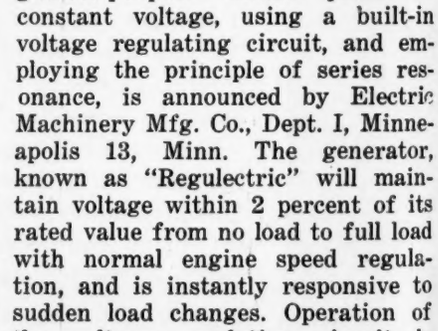
Laminated waterproof bags.

bags may be made waterproof, acid-resistant, grease-resistant or oil-resistant and protection against various other hazards may be built into the bags as needed.

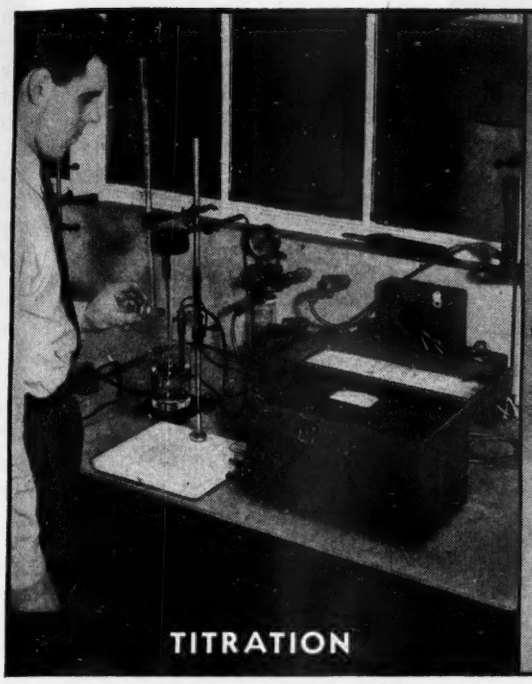
Among the products that can be packed by such bags are: cereals, roasted coffee, flour, special flour mixes, horseradish roots, dry salt meat, popcorn and special sugars, such as powdered sugar.

A-C Generator

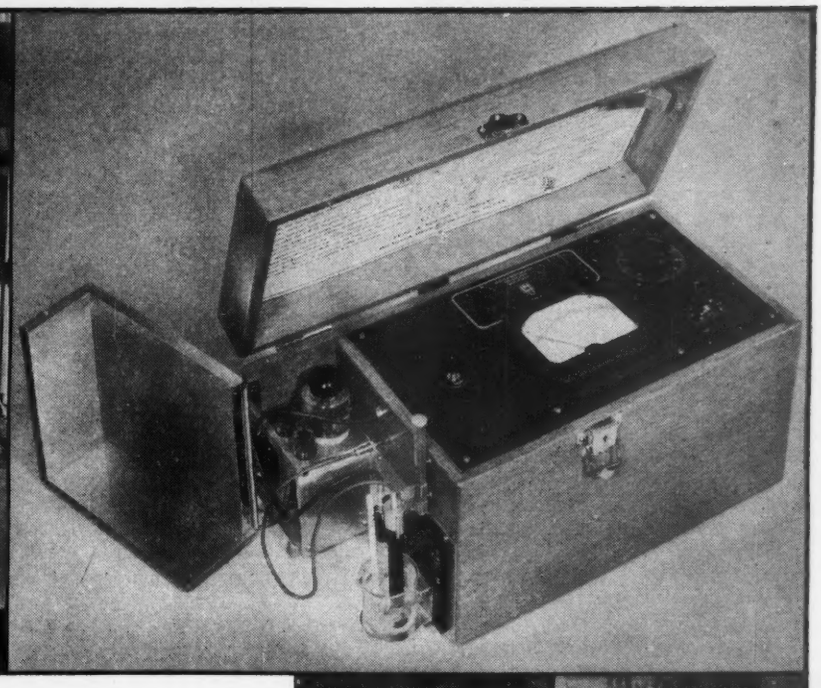
AN a-c generator, for use in engine generator sets, which provides a general-purpose electric power at constant voltage, using a built-in voltage regulating circuit, and employing the principle of series resonance, is announced by Electric Machinery Mfg. Co., Dept. I, Minneapolis 13, Minn. The generator, known as "Regulectric" will maintain voltage within 2 percent of its rated value from no load to full load with normal engine speed regulation, and is instantly responsive to sudden load changes. Operation of the voltage regulating circuit is purely electrical, responding quickly to maintain high voltage for starting motors. The regulating circuit has no moving parts, thereby simplifying maintenance. This generator is built in ratings from 5 to 15 kw.



A-C generator provides power at constant voltage.



TITRATION



pH INDICATOR FOR "EVERYBODY"

Here's the pH Indicator for the man who is *not* a pH expert. It's intended to be carried around and used wherever desired—in plants as well as labs. It's as sturdy and dependable as a temperature indicator. It will stay on the job. To use it, you just make 3 simple adjustments, then put the sample into the beaker and see where the needle points.

"Sticky" weather or surroundings won't affect this Indicator, unless relative humidity is over 95 and ambient temperature is over 85 F. It's fine for laboratories, kitchens, refrigerated chests, packing rooms and power plants.

Solution to be checked can be at any temperature to 50C (120F). Thick solutions and "soft" solids like butter, cheese, dough and many meats, earth, etc., can be checked almost as easily as slurries or clear liquids.

Nearby electrical equipment won't affect this instrument. It requires very little attention. Its scale is substantially longer and easier to read than in any comparable Indicator. Constructionally, it's a fine job. Complete with everything necessary for pH measurements.

Further details are in Catalog E-96(2), sent on request, but if you have a pH measuring problem we suggest you check with an L&N engineer.

WATER CHEMICALS

CONTROL-LAB TESTS

METALS BOTANY

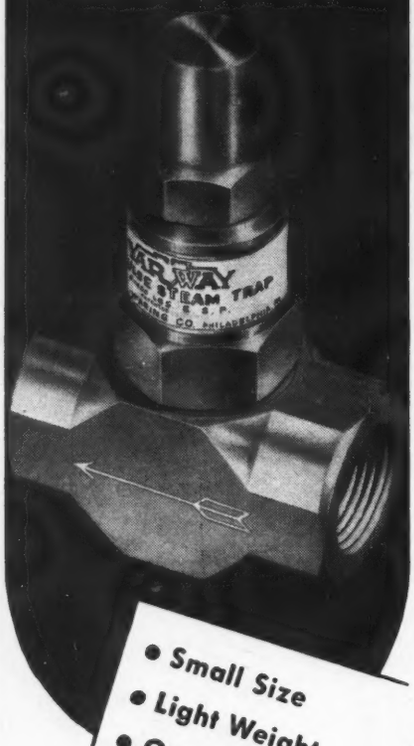
LEEDS & NORTHRUP COMPANY, 4912 STENTON AVE., PHILA. 44, PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Jrl. Ad. E-96(25)

QUICKER HEATING



- Small Size
- Light Weight
- One Moving Part
- Low Price

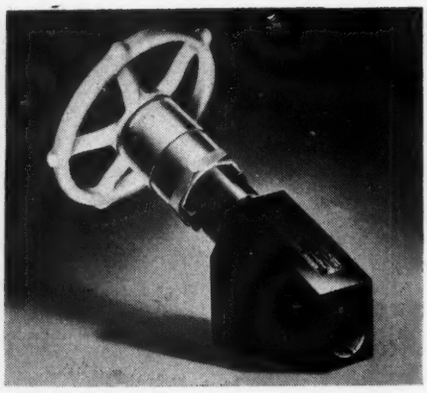
OVER 450,000 SOLD

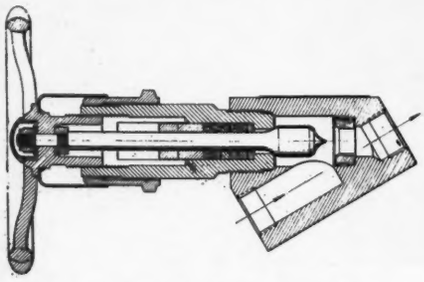
Sold by more than 100 Mill Supply Distributors throughout the U. S. A. See your supply house or write for Catalog T-1739.

YARNALL-WARING CO.
127 Mermaid Avenue, Phila. 18, Pa.

YARWAY

IMPULSE STEAM TRAP





30 deg. angle globe pattern valve.

Valves

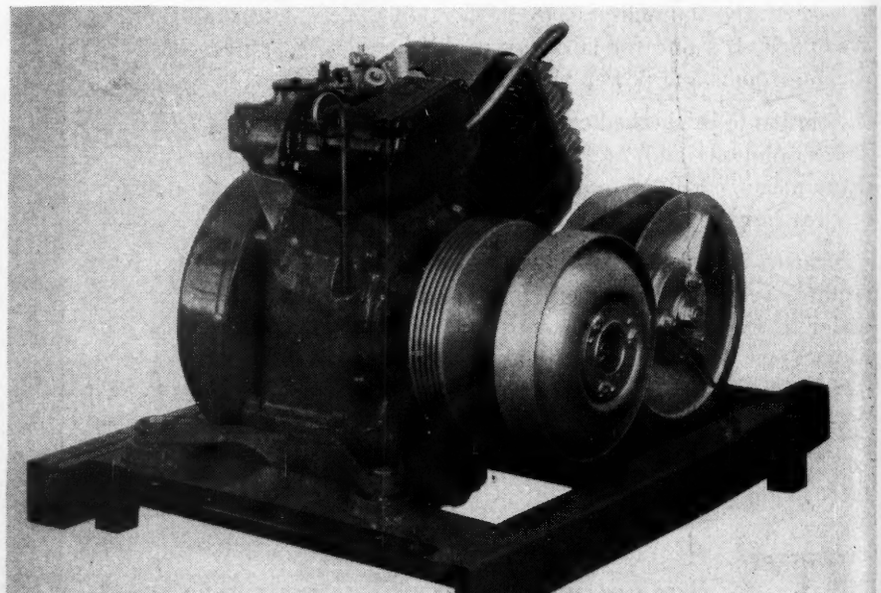
So that the change in direction of fluid flow through the valve is reduced to the minimum, a 30 deg. globe pattern valve has been designed by Grove Regulator Co., Dept. I, 65th & Hollis St., Oakland, Calif. As a result, turbulence is almost entirely eliminated. The flow stream is carried through the valve in the direction of closing. Expansion takes place directly into the downstream line, after the flow has passed through the valve. Thus the chance for wire drawing and cutting action is almost entirely removed.

A solid one-piece stem and plug is employed to effect absolute tight shut-off. Essential operating parts of the valves are provided with constant "life-time" lubrication by a special factory sealed process. The sealed lubricant is zoned entirely away from the flow stream and is to insure lasting permanence.

Power Package

THE automatic operation of the principle of adjustable diameter drive and driven pulleys, linked by a V-belt to provide varying drive ratios, has been applied to a power package, marketed by the Salsbury Motors, Inc., Dept. I, 4464 District Blvd., Los Angeles 11, Calif. This principle is now made available in the low horsepower field.

The unit consists of a variable diameter drive pulley, a variable diameter driven pulley and a V-belt. These units form a coordinated assembly that gives automatic, infinitely variable ratios over a 4 to 1 range. It is a true torque converter. Drive ratio is controlled as a function of the driven shaft speed. Normal overall reductions may range from 4 to 1 to 1 to 1 for light duty, high speed units, and from 200 to 1 to 50 to 1 for heavy duty, low speed requirements. Automatic change of ratio within these limits may be adjusted to suit the needs of the individual user. The V-belt used for this drive may be expected to have a normal life of 1,000 to 3,000 hours.

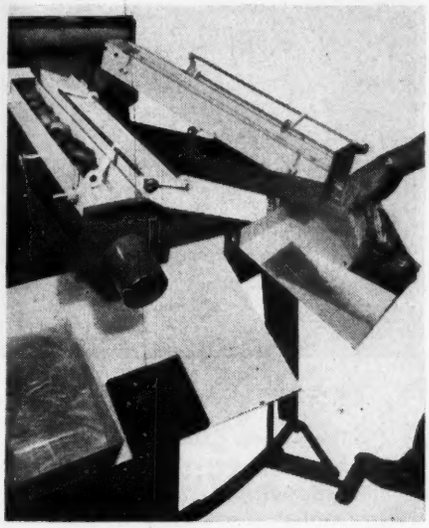


Power package with automatic transmission.

Built into the drive pulley of this unit is the automatic, centrifugally operated, opposed-shoe-type clutch providing velvet-smooth engagement and disengagement with acceleration or deceleration of the engine. The engine is Model 600 and is a single-cylinder, four-cycle, air-cooled type, developing 6.5 hp. at 3,200 rpm.

Fruit and Vegetable Bagger

TO BAG fruits and vegetables on a production basis, Food Machinery Corp., Dept. I, Dunedin, Fla., announces its "Champion Bagger." Such products as oranges, apples, peaches and tomatoes are successfully bagged by this machine without bruising and at speeds of two bushels per minute. All parts of the machine that contact the product are cushioned with rubber sponge to eliminate the possibility of bruising. The unit is easily adjusted to handle different size fruits or vegetables. It requires a floor space of about 10 sq. ft.



Fruit and vegetable bagger.

Retort Tags

TO OBTAIN a check on retort temperature conditions and to supplement indicating or recording thermometers or pressure gages in retorts, retort color printed paper tags called "Ati Cook-Chex," have been developed by Aseptic-Thermo Indicator Co., Dept. I, 4665 Hollywod Blvd., Los Angeles 27, Calif. The color on the tags not only indicates temperatures reached but also minimum time the temperature is maintained in various parts of the retort chamber. Trapped hot air in retorts due to inadequate venting, in addition to being a poor heat conductor, may

We Didn't Want to Make Strainers

BUT we needed them for use with Yarway Steam Equipment and couldn't find any to suit us.

So we designed the *YARWAY Strainer.*

Apparently a lot of other people were having "Strainer trouble" because, without a line of advertising, the Yarway Strainers *purchased* in a few years now number *many thousands.*

Why don't you look into this better Strainer for your money? Buy one from your supply house (over 100 Mill Supply Houses now have them).

Cadmium Plated for protection against corrosion and for better appearance.

Examine its *high grade Monel woven wire screen* that stops dirt—lets condensate or other fluids flow freely.

Notice the removable blow-off bushing. Screen and bushing come out together—go back together, *automatically aligning.*

Six standard sizes from ½" to 2" for pressures to 600 lb.

See your Mill Supply House or write for Bulletin S-201

YARNALL-WARING COMPANY
127 MERMAID AVE. PHILADELPHIA 18, PA.

YARWAY STRAINERS

Mathews

TROLLEY CONVEYERS

Engineered to serve Production

Trolley Conveyers are especially practical in busy, crowded plants where floor space is at a premium and the more common floor types of conveyer cannot be applied without sacrificing this much needed floor space. Trolley Conveyers, by means of transverse bends dipped down to working height at pre-determined points in the plant, can keep materials flowing steadily at a controlled speed. A variety of types of hooks and hangers add to the flexibility of Trolley Conveyer systems. There is a Mathews Engineer operating in your vicinity. He will be glad to have an opportunity to tell you about Trolley Conveyers, and about the many other types of Mathews Conveyers which have been engineered to serve production. Your inquiry involves no obligation. Write or wire for engineering service.

MATHEWS CONVEYER COMPANY
ELLWOOD CITY, PENNSYLVANIA
SAN FRANCISCO, CAL. • PORT HOPE, ONT.
ENGINEERING OFFICES IN PRINCIPAL CITIES

Retort tags in frame container.

mislead operators by showing a sufficient pressure but not necessarily a sufficiently high temperature in the retort and thus falsely indicate proper processing conditions.

Retort tags afford an effective measure of retort conditions directly at the crate level. The tag indicator is based on an easily distinguishable, sharply end-pointed color patch that changes from purple to green. The change will not occur unless the tag has been subjected to moist heat for the period of time and to the temperature for which it was intended. It will not react in hot air under any conditions; either steam or superheated water must be present for it to react.

Tags are available for processes at 214 through 260 deg. F. and for times from 3 minutes upward to 105 minutes. Both qualitative and quantative types of retort tags are available. The appearance and indicator efficiency of the tags are not affected by any conditions of light and aging.

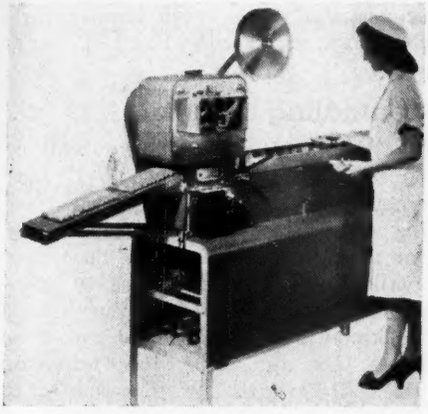
A metal frame container that is easily and permanently attached to crates is available. This provides rapid placement and removal and full visibility of the tags.

Tags are usually affixed to crates at the loading machine where a batch number is entered on the tag. As each crate is removed after proc-

essing, the operator checks the tag for proper color change. The tag is removed at the labeling area and is preserved as an integral part of the production and quality control record for future reference.

Frankfurter Banding

AN automatic frankfurter banding machine, using a double band, cartridge-like, banding material, called "Kartridg-Pak," is announced by Marathon Corp., Dept. I, Menasha, Wis. The machine requires no special foundation and may be operated by plugging into an ordinary light socket. Wieners are fed to the stainless steel conveyor belt one at a time, which feeds them into the sealing unit. A band is threaded from the top and bottom of the machine, the joint is then heat-sealed between each frankfurter, and a slight perforation is put between each banded and sealed frankfurter. This permits



Loading wieners on the conveyor belt, which feeds them through the bander.

Demonstrating the easy handling of banded frankfurters.

CRCO-American

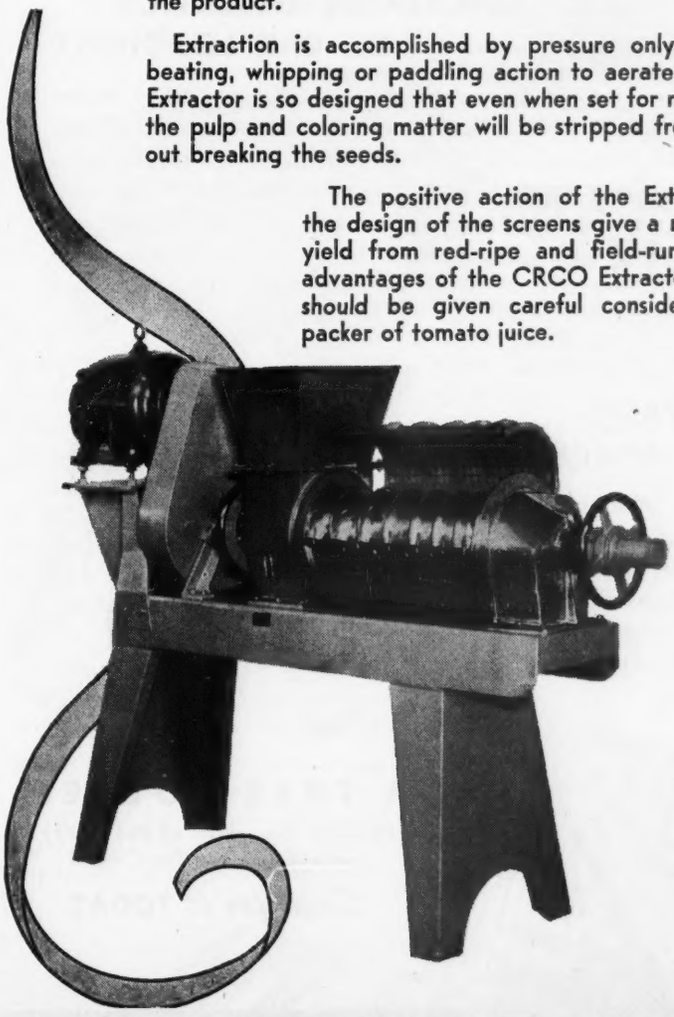
Extractors

Give Maximum Efficiency On Any Tomato Juice Line!

CRCO-American Juice Extractors will give from 75% to 90% recovery of tomato juice at capacities up to 60 gallons per minute, depending on the model of Extractor and the condition of the product.

Extraction is accomplished by pressure only, there being no beating, whipping or paddling action to aerate the product. The Extractor is so designed that even when set for maximum recovery the pulp and coloring matter will be stripped from the skins without breaking the seeds.

The positive action of the Extractor screw and the design of the screens give a much higher color yield from red-ripe and field-run tomatoes. The advantages of the CRCO Extractors are many and should be given careful consideration by every packer of tomato juice.



WRITE FOR BULLETIN

THE BEST OF Everything

CHISHOLM-RYDER

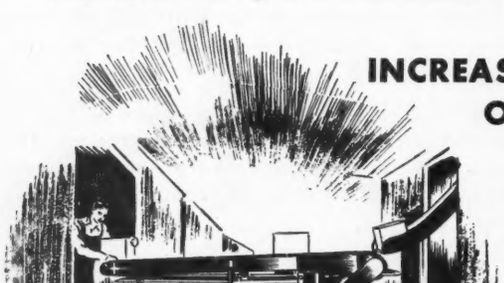
Niagara Falls, New York

FOR THE FOOD PROCESSOR

More Units per Hour... in *More* Tough Spots... with *Less* Labor...

LESS SPOILAGE
LESS DEMURRAGE

The LAMSON Utility Conveyor rolls right up to the freight car that *must* be unloaded. Two men can unload a vital car in a hurry with a LAMSON.

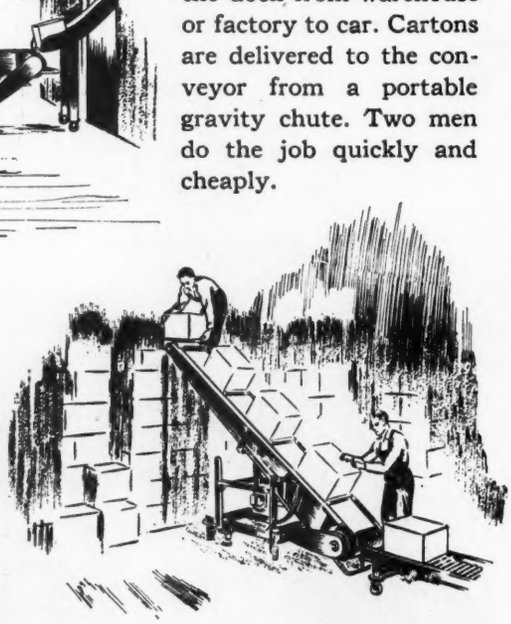


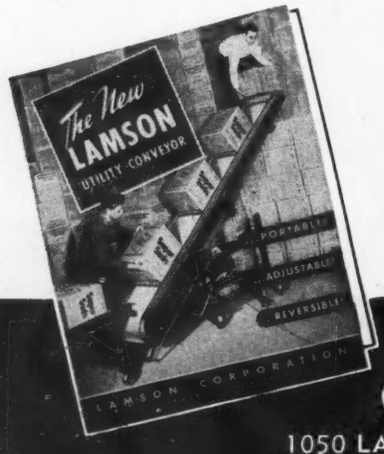
INCREASES EFFICIENCY OF CAR LOADINGS

Lamson Utility spans the dock from warehouse or factory to car. Cartons are delivered to the conveyor from a portable gravity chute. Two men do the job quickly and cheaply.

INCREASES FLOOR-SPACE

When the stock piles must go higher, or the floor-space be enlarged, the Utility Conveyor enables fewer men to pile higher—quicker—and safer.





A FREE FOLDER
PROVES the worth of the utility conveyor in the food world
***Send for it* TODAY**

LAMSON CORPORATION
1050 LAMSON ST., SYRACUSE 1, N. Y.

the separation of any number of wieners. A packaging speed of 90 wieners per minute can be obtained. The construction of the band provides greater printing space.

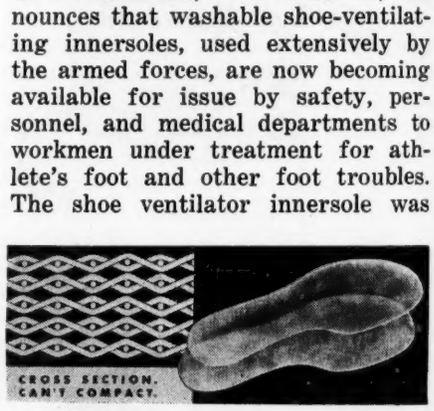
Heat Sealer

PACK-RITE MACHINES, Dept. I, 714 W. Wisconsin Ave., Milwaukee 1, Wis., announce the development of their solenoid-operated sealer. It is equipped with 30-in. hard chrome-plated either horizontal-crimped or flat sealing bars. They will heat seal unusually large bags, pouches, sheets, etc., by pressing the safety foot switch which actuates the replaceable-ram solenoid and thus eliminates foot pressure effort on the operator's part. This permits freedom of both hands for feeding the material into the sealer.

The dial thermostat controls the temperature in the heating elements, providing a range of heat in the sealings bars of the machine which can be adjusted from room temperature to as high as 550 deg. F.

Ventilating Innersole

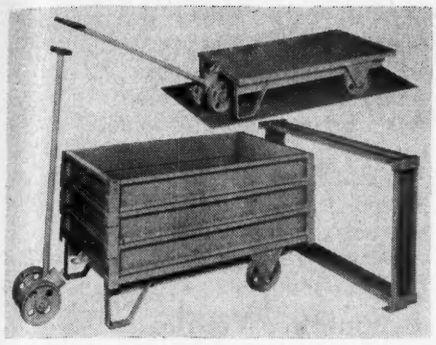
DALE VENT-O-SOLE, INC., Dept. I, 60 E. 42nd St., New York 17, announces that washable shoe-ventilating innersoles, used extensively by the armed forces, are now becoming available for issue by safety, personnel, and medical departments to workmen under treatment for athlete's foot and other foot troubles. The shoe ventilator innersole was



Washable ventilating innersoles.

developed at the request of the Quartermaster General's office. Army tests led to their adoption as government issue.

This shoe ventilator is used by slipping it into the shoe and leaving it there. Though it gives a pleasant, sure-footed feeling, it is not medicated. Its function is entirely mechanical. Each step the wearer takes pumps air into the shoe, circulates it over the grid of woven plastic, evaporates moisture from the plastic surface and expels the moisture-laden air. As a result feet stay warm and dry in winter and cool and dry in summer, conditions physicians have long recognized as conducive to healthy feet.



Steel semi-skids and jacks.

Semi-Skids and Jacks

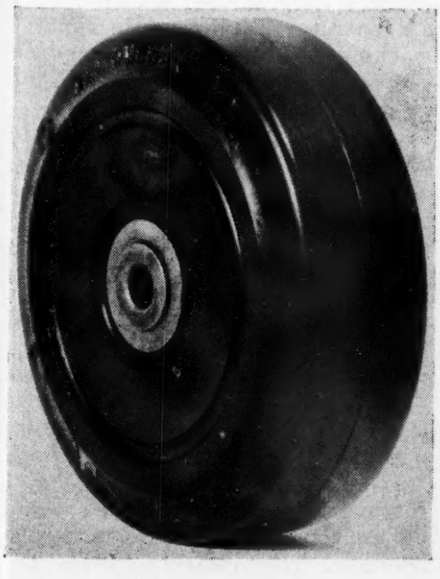
MARKET FORGE CO., Dept. I, Everett, Mass., announces a line of semi-skids and jacks made entirely of steel with a high tensile steel deck. By replacing the wood deck with steel such difficulties as shrinking, expanding and warping are eliminated.

The unit is a completely fabricated and arc-welded arrangement, dispensing with all nuts, bolts and rivets with the exception of the two bolts which anchor the rear wheel. The 8-in. diameter rear wheels are substantially mounted in steel supports.

All-Rubber Industrial Wheel

AN all-rubber industrial wheel constructed with a metal bearing sleeve, molded integrally in a hard rubber core in which ball bearings for a choice of axle diameters are mounted, is announced by the B. F. Goodrich Co., Dept. I, Akron, Ohio.

Carrying capacity ratings for all-rubber wheels are equal to those for vulcanized-on tires and metal wheels of the same size, but resistance to extreme impact loads is less because



All-rubber industrial wheel.

SERVICE STEPPED UP

AT LOWER COST FOR ALL AIR EXPRESS SHIPMENTS

NOW! THE LID IS OFF

More Planes, More Flights — For Everybody. Priorities No Longer Needed!

More Planes in service, more flights, more space available for all kinds of traff. Bigger planes, swifter planes, faster air schedules on many runs!

Every way you figure, Air Express service is stepped up to an all-time high at all-time low in cost to the shipper.

Reduced Rates (see table) include special pick-up and delivery between airport towns and cities. Rapid air-rail schedules to and from 23,000 other communities in this country.

Foreign Service direct by air to and from scores of foreign countries — the world's best service, in the world's best planes.

Write Today for the Time and Rate Schedule on Air Express. It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 1 Or ask for it at any Airline or Railway Express office.

RATES CUT 22% SINCE 1943 (U.S.A.)

AIR MILES	2 lbs.	5 lbs.	25 lbs.	40 lbs.	Over 40 lbs. Cents per lb.
149	$1.00	$1.00	$1.00	$1.23	3.07¢
349	1.02	1.18	2.30	3.68	9.21¢
549	1.07	1.42	3.84	6.14	15.35¢
1049	1.17	1.98	7.68	12.28	30.70¢
2349	1.45	3.53	17.65	28.24	70.61¢
Over 2350	1.47	3.68	18.42	29.47	73.68¢

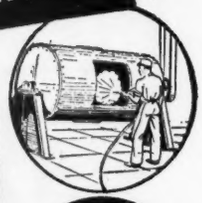
INTERNATIONAL RATES ALSO REDUCED

AIR EXPRESS

GETS THERE FIRST

Phone AIR EXPRESS DIVISION, RAILWAY EXPRESS AGENCY
Representing the AIRLINES of the United States

Cut Your Cleaning Costs—
WITH A *Farquhar*
Hi-Pressure CLEANING UNIT
USING HOT OR COLD WATER



10 Gal. Per Minute
5 H. P. Motor
20 Gal. Per Minute
7½ H. P. Motor

A Portable Cleaner for Every Job

SAVES TIME—SAVES LABOR

To clean all mobile or stationary equipment—walls, floors, tank, vats, conveyors, pasteurizers, storage bins, utensils, etc.—this time and labor saving cleaner has as many uses as you have different cleaning jobs—uses a high velocity jet of hot or cold water at pressures from 300 to 500 pounds to dislodge and sweep away accumulations of process refuse, residue and other debris.

Thousands of these hi-pressure pumps have been built by Farquhar and have proven efficient over years of operation. This cleaning unit will eliminate much tedious hand work without damage to delicate equipment. Operation is extremely simple; the high velocity jet can be directed to clean quickly large surfaces as well as out-of-the-way areas.

Accessory nozzle and suction equipment is available for use with concentrated cleaning solution where extreme conditions exist. Portable unit as shown, also available on a skid base without wheels for permanent installation.

Specialists in Machinery for Industries Since 1856

HI-PRESSURE CLEANING UNITS · HYDRAULIC JUICE PRESSES · FABRICATED VESSELS · BOILERS · SAWMILLS · AND SPECIAL MACHINERY OF ALL KINDS

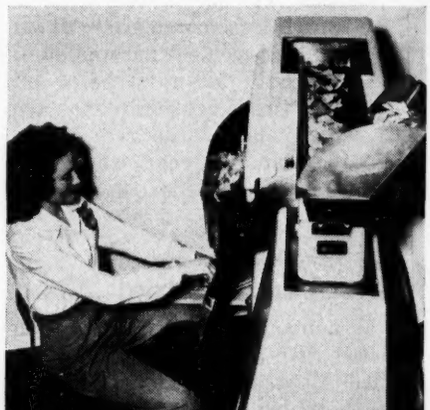
1856 NINETIETH ANNIVERSARY YEAR 1946
A. B. FARQUHAR COMPANY

1290 Duke St. York, Pa.

hard rubber shatters more readily than cast iron. They are, therefore, not recommended where extremely rough usage is encountered. In services where agents corrosive to metal wheels, or detrimental to the rubber-to-metal bond, cause early failure of rubber tires vulcanized-on to metal wheels, the new all-rubber wheel is especially recommended.

Automatic Weigher

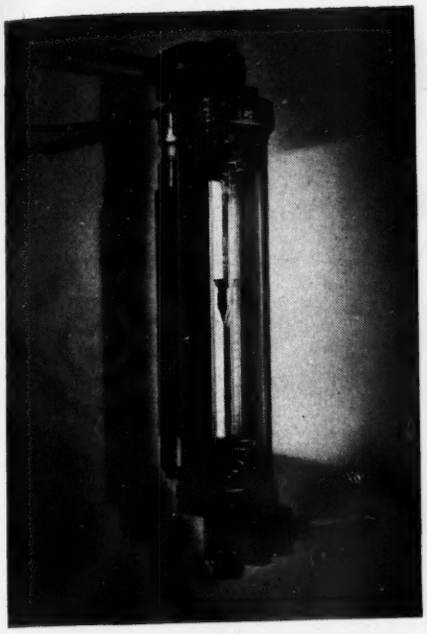
WRIGHT'S AUTOMATIC MACHINERY Co., Dept. I, Durham, N. C., announces an automatic weigher for such products as potato chips, popcorn, cereals, nuts and many other food products. The food is fed to the weigher in a continuous stream. Two buckets are mounted in the machine. While one bucket is receiving the product as it rests on the weighing device, the other bucket discharges its load into a chute. Only one operator is required to run the machine and to place the bags on the side of the chute to receive the product. Users are said to have reported handling an average of 20 to 25 bags per minute of ¾-lb. packages.



Automatic weigher in action.

Rotameter Lighting Device

AN inexpensive lighting device for their universal rotameter, has just been introduced by Schutte & Koerting Co., Dept. I, 12th and Thomson Sts., Philadelphia 22, Pa. The device is a baked-enamel metal hood fixture with narrow frontal opening, which fits snugly against the back of a rotameter tube, and directs a beam of light to the glass towards the operator. This clearly outlines the rotor and the meter scale, even when



Rotameter lighting device.

the metered fluid is semi-opaque in character.

The unit can be easily attached to any SK 250 mm. length universal rotameter by means of a bracket furnished with each device. Pushbutton socket, 10 ft. of rubber-covered attachment cord and plug are included.

Portable Conveyor

LOADING and unloading trailer trucks in a minimum of time is accomplished by a portable conveyor, designed for the purpose by Standard Conveyor Company, Dept. A, North St. Paul 9, Minn. This conveyor can be operated to any desired distance up to 19 ft. by one man who can unload 800 cases in 30 minutes. The unit will handle a load of 20 lb. per ft., will convey commodities up to 19 in. wide, and is equipped with a ½ hp. motor. It operates in either direction.

Portable conveyor.

DEATH TO FLIES*

IN AREAS OF 500,000 CUBIC FEET! THE NEW WEST HYDRO-MIST VAPORIZER AUTOMATIC — JUST FILL AND PLUG IN!

A new, outstanding and completely automatic insecticide sprayer. Simple to operate—merely fill, set time clock, and plug in to AC or DC outlet. One filling of the West Hydro-Mist Vaporizer with Vaposector Fluid will efficiently control roaches in an area up to 50,000 cubic feet, and achieve a POSITIVE KILL of flying insects in areas of 500,000 cubic feet!

CONCENTRATED VAPOSECTOR FLUID

Amazingly Effective Insecticide for use in the West Hydro-Mist Vaporizer

VAPOSECTOR FLUID is a concentrated insecticide especially effective for use in Electric Sprayers. It has a high killing efficiency and is economical and highly effective against flies, roaches, mosquitoes, ants, fleas, crickets, spiders and many other insects. It will cause roaches to crawl out of their hiding places to be killed easily. This insecticide is harmless to food and fabrics, when used according to directions

*Vaposector Insecticide when dispersed by the Hydro-Mist Vaporizer can achieve a positive kill of such flying insects as Flies, Gnats, and Mosquitoes in areas of 500,000 cubic feet!

ASK FOR A DEMONSTRATION

Seeing Is Believing!

or

Write for FREE Booklet

CLIP TO YOUR BUSINESS LETTERHEAD, PLEASE

WEST DISINFECTING Company

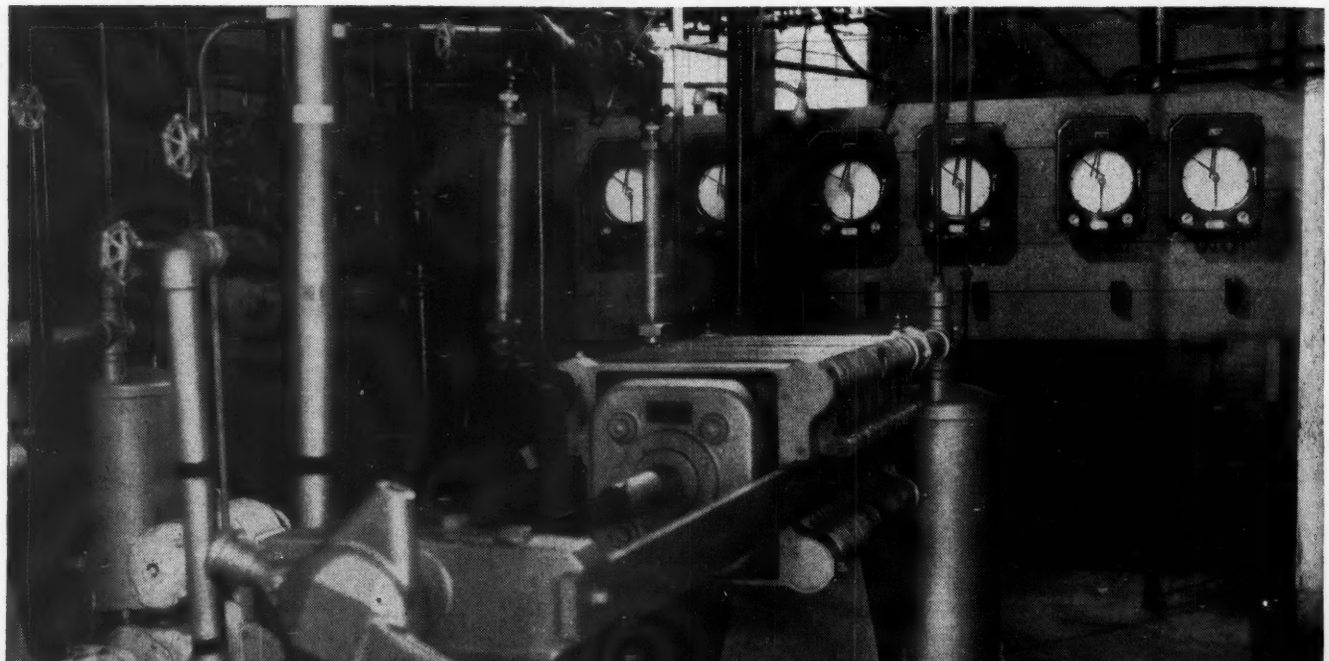
42-16 WEST ST., L. I. CITY 1, N. Y., DEPT. F

We are interested in a demonstration of the West HYDRO-MIST VAPORIZER ☐

Please Send Me Your Booklet ☐

Name_____ Position_____

Plate-type juice heaters have "Automatic Pilot"



THIS Taylor control system helps Loudon Division of Standard Brands get top performance from their Walker-Wallace plate-type juice heaters. A battery of these short-time, high temperature heaters are equipped with Taylor Fulscope Recording Temperature Controllers, which automatically guard the purity of Standard Brands' popular V-8 Cocktail and help keep the distinctive flavor right on the beam.

After the vegetable juices are blended together, the mixture is pumped into the heat exchanger where it is heated to the desired pasteurizing temperatures by means of a water circulating system. Part of the raw juice entering the exchanger is by-passed to cool the pasteurized juice leaving the exchanger, and the raw juice in turn is economically preheated before being diverted to the heater section.

One instrument controls (and records) temperature of juice from exchanger to filler by means of control valve in raw juice by-pass. Second pen records temperature of raw juice entering heater. Other instrument controls (and records) temperature of juice leaving heater, having control valve in steam line. Second and third pens record temperature of juice in holding line returning to heater, and temperature of water in circulating system.

Whatever food processing problem you have, Taylor wants to help you solve it. For complete details, see your Taylor Field Engineer or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

Taylor Instruments

MEAN

ACCURACY FIRST

IN HOME AND INDUSTRY

CATALOGS, BULLETINS

This selected information on new publications is offered by FOOD INDUSTRIES Readers' Service through cooperation with the manufacturers. It helps executives save valuable time. To obtain literature described, simply fill in form below, clip it to your letterhead and mail to FOOD INDUSTRIES. There is no cost no obligation.

Food Plant Equipment

Materials Racks 1

American Machine & Foundry Co. describes and illustrates, in a 4-page bulletin, automatic material handling racks. Spring powered racks hold a visible bank of material and bring each piece to the operator's hand level as soon as the preceding piece has been removed.

Steel Strapping Equipment 2

Round steel strapping equipment for use in reinforcing cartons, boxes, crates and other shipping containers is described and illustrated in a 20-page book, entitled "Blue Book of Packaging," released by Gerrard Steel Strapping Co. Over 100 illustrations of round steel strapping equipment in use, both for domestic and export shipments, are shown. Valuable charts, giving shippers information on strapping methods with the whys and wherefores of good shipping practice, also appear.

Floodlight Unit 3

An illustrated data sheet, which carries full specifications on the design, construction and operation of a gasoline-driven floodlight unit, has been released by the Consolidated Diesel Electric Corporation. Light and auxiliary power are provided by this portable unit. It furnishes 120 volts, single phase, and 208 volts, three-phase current, to four 1000-watt adjustable wide-diffusion lamps.

Confectionery Equipment 4

National Equipment Co. has released two bulletins illustrating and describing their improved Enrober automatic decorator and pump bars. The text tells how they work, what their advantages are and their general dimensions.

Round Processor 5

Bulletin G-421, describing a ruggedly designed round mixing unit, has been made available by Cherry-Burrell Corp. The unit is made of plain steel or stainless steel, ranging in size from 300 to 1,000 gal. The illustrations show two different types of agitators directly connected to the motor on the framework over the tank. The booklet tells why this processor is particularly suited for mixing and processing heavy-bodied products such as ice-cream mix, chocolate milk, evaporated or condensed milk. The heating system by either steam or hot water, the cooling operation and the other parts of the unit are all described in detail.

Franklin Filter 6

General American Transportation Corp. has issued 4-page Bulletin No. 101 describing the Conkey rotary disc vacuum filter, a continuous type of filter. The folder contains information on the applications, operation, construction, auxiliary equipment, standard sizes, weight and dimensions.

Plant Supplies

Electric Welding 7

Tweco Products has just released a 12-page catalog, known as "1946 Twecolog," in which are described and illustrated a complete line of manual arc welding electrode holders. Complete specifications are given, such as the electrode capacity and their sizes, weights, length and other engineering data. This line is of particular interest to those who perform electric welding in their manufacture or maintenance of equipment.

Waterproof Bags 8

A 12-page booklet, entitled "Seven Facts," dealing with construction and applications of laminated waterproof bags, has just been issued by Bemis Bro. Bag Co. The seven points include: protection afforded, how to meet specific requirements, construction choice and printing possibilities.

Shaft Seal 9

Ingersoll-Rand Co. announces the publication of a two-color, 16-page bulletin, Form 7100, which gives a graphic presentation of the Cameron shaft seal as an answer to stuffing box problems. Its function is to prevent leakage along the drive shaft of centrifugal pumps.

The booklet contains many cross-sections and pictures of typical shaft seal installations. The various component parts of the seal are shown assembled and in "exploded" views, together with a discussion of the operation and the advantages to be expected.

Sanitizing Egg Plants 10

A 6-page booklet, known as Bulletin E-2, describes the best means of maintaining optimum bacteriological control in egg freezing and drying plants, has been anounced by The Emulsol Corp. Through the use of a detailed chart and explicit descriptions, the booklet illustrates the sanitizing effectiveness, simplicity and economy of Emulsept, the new odorless, nontoxic, non-irritating concentrated germicidal detergent. The information contained in this bulletin can be helpful to all food processors.

Corrosion Resistant Alloys 11

A technical data book on heat and corrosion resistant alloys has been released by The Cooper Alloy Foundry Co. It contains concise information on mechanical and physical properties, chemical analysis ranges and corrosion resistance of stainless steels, nickel, monel, carbon and low alloy steels and other alloys.

Chlorination Instruction Book 12

A 50-page book of instructions on the uses of "Perchloron" in sanitation, water purification, sewage disposal and as a bactericide in the food industry, has been issued by The Pennsylvania Salt Manufacturing Co. It tells how "Perchloron," produced largely for the armed forces during the war, is now available in quantity for large public and private users, for whom the book is designed. Following a description of the product, which is 70 percent avail-

Good until October, 1946

FOOD INDUSTRIES READERS' SERVICE

FOOD INDUSTRIES, 330 W. 42nd St., New York City 18

Please have manufacturer send me, without obligation, literature circled below.

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8-46

is as Colorful and Flavorsome as the Red Ripe Tomato!

Buflovak

EVAPORATORS ASSURE "FANCY GRADE" PRODUCTS

For the concentration of tomato pulp, BUFLOVAK Double Effect Stainless Steel Evaporators are standard equipment among many of the large producers of high quality tomato products.

Designed and built expressly for this use, this equipment has many exclusive features which assure a "fancy grade" product at low production costs, uniform results, and ease of operation.

A high density product of brilliant color, good flavor and uniform texture, is continuously produced 24 hours a day, 6 days a week, with BUFLOVAK EVAPORATORS —and this *without cleaning or loss of capacity!*

Buflovak Tomato Pulp Evaporators have exceptionally large capacities. They concentrate continuously 3500 gallons of pulp per hour to a density of 26-30% solids. All material is finished to final concentration without loss of product.

We invite you to write today for full details on BUFLOVAK Evaporators. Maybe our other Food Processing equipment might be valuable to you also. Write for Buflovak's NEW BOOKLET describing all its equipment.

BUFLOVAK EQUIPMENT DIVISION OF BLAW-KNOX CO.
1631 FILLMORE AVENUE
BUFFALO 11, N. Y.

able chlorine, it gives instructions on methods of preparation and application. A section is devoted to the prevention of food contamination by micro-organisms.

Control Equipment

Fuel Losses 13

A 16-page bulletin, "How To Cut Your Fuel Bill," is available from the Campbell Engineering Co. Different models of electric draft controls are illustrated. Installations showing fuel savings and elimination of smoke are included. The bulletin describes how electric draft controls operate with stokers, oil and gas burners. A list of users is given.

Electronic Metal Detector 14

Radio Corporation of America announce an electronic metal detector, which is described in a 4-page bulletin. It tells how metal particles of any kind are detected in nonmetallic material such as foods. Important features of the detector are enumerated.

Materials Handling Equipment

Belting 15

Hewitt-Robins, Inc. has released a two-color, loose leaf publication that includes specifications on the company's wide line of conveyor, transmission and elevator belting. Maintenance suggestions on how to prolong the life of belts and avoid costly production delays are included.

Many uses are illustrated by plant photographs. Belt constructions are shown by sectional drawings. The text is written in simple nontechnical terms.

Portable Conveyor 16

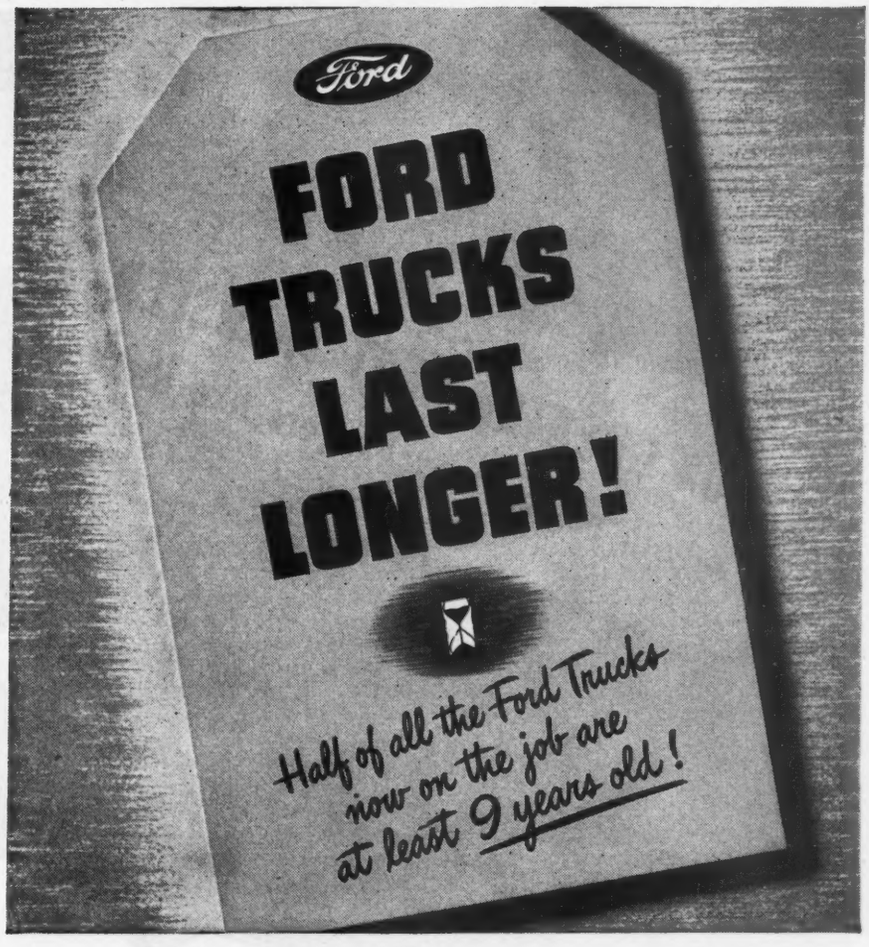
Speedways Conveyors, Inc., has printed Bulletin SL-246, describing in some detail their adjustable, reversible, portable belt conveyor. The illustration shows how the conveyor is mounted on a small truck and a description of how it can be adjusted to several elevations and angles from the horizontal position are given.

Wire Belts 17

Bulletin No. 83 has been issued by The Cambridge Wire Cloth Co. describing conveyor belts of various types and weaves. This bulletin is generously illustrated with photographs of the principal kinds of belts offered. A list of applications is also given.

Rotary Pump 18

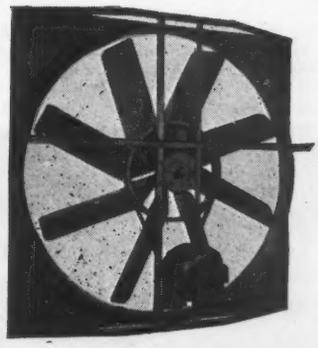
Positive displacement rotary pumps for moderate or low viscosity liquids under medium pressure are described in a bulletin issued by Quimby Pump Division of H. K. Porter Co., Inc. These pumps can be used for pumping



The Difference between PROFIT AND LOSS . . .

Coolair TRADE MARK

EXHAUST FANS



SUCCESSFUL MANAGEMENT PRACTICE dictates healthful working conditions in controlling operating costs. Since labor costs in many plants are important enough to mean the difference between an operating profit or a loss, the answer may well be simply to increase the efficiency of present workers with a plentiful flow of fresh, cooling air.

COOLAIR'S TYPE-O EXHAUST FAN, made in many sizes, is easily installed in side-walls, window openings or on the roof. Your Coolair dealer can demonstrate how this size flexibility makes possible an economical, tailored-to-fit job in *your* plant. Why not call him in *today*, or write us direct for information.

ENGINEERS and ARCHITECTS
For descriptive and technical data see:
SWEET'S CATALOG FILE Architectural
SWEET'S CATALOG FILE for Builders
A.S.H.V.E. GUIDE
ELECTRICAL BUYER'S REFERENCE

AMERICAN COOLAIR CORPORATION
"Pioneer Manufacturers of V-Belt Drive Exhaust Fans"
3604 Mayflower Street Jacksonville 3, Florida

A SIZE TO MEET YOUR NEEDS. Heliflow *heat exchangers are available in sizes capable of handling up to 200 gallons a minute.*

ASSEMBLING *one of the new* Heliflow *heat exchangers. Use of Monel, nickel or Inconel tubing assures freedom from metallic contamination. These lightweight, easily cleaned units are made by the* GRAHAM MANUFACTURING COMPANY, *New York.*

Heliflow is a new type of heat exchanger that boosts heat transfer forty per cent.

Made by the GRAHAM MANUFACTURING COMPANY, New York, *Heliflow* units consist of a series of spiral coils within a housing. One fluid flows inside the coils; the other circulates outside them.

There are no dead spaces, and constant velocity is maintained throughout the path of flow. Tubular expansion is automatically compensated. The tubing itself—acting like a spring—relieves all stresses.

Long life plus protection

Heliflow units designed to handle liquid foods are supplied with tubing of Monel,* nickel or Inconel.*

All three metals are strong and tough. They combine good to excellent heat transfer rates with immunity to rust and excellent resistance to corrosion. These properties combine to insure long service life, efficient heat transfer and maximum protection of product purity.

Write for this helpful booklet

Food processors will find our illustrated booklet *Heat Transfer Through Metallic Walls* a valuable addition to their reference files. It contains, in readily accessible form, information of the kind most frequently sought to meet heat transfer problems. Ask for your copy today.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N. Y.

NICKEL (INCO TRADE MARK) **ALLOYS** MONEL* • "K" MONEL* • "R" MONEL • "KR" MONEL • "S" MONEL • INCONEL* • NICKEL • "L" NICKEL* • "Z" NICKEL*
*Reg. U. S. Pat. Off.

lubricating, non-lubricating and viscous liquids. The folder contains complete specifications, dimensions and performance charts.

Miscellaneous

Waterproof Liners 19

Protective Coatings Corp., has issued a well-illustrated brochure of 16 pages on the application of "Aquastop," a synthetic impregnated, waterproof, sealed case liner. It describes the steps in applying Aquastop to shipping case panels as well as the method of sealing.

Industrial Research 20

A 20-page pamphlet, entitled "Industrial Research Progress at Armour Research Foundation of Illinois Institute of Technology 1944-45," has been released by Armour Research Foundation. It describes the facilities and activities in food products research, as well as those in other major fields of chemistry, engineering, metallurgy, etc. It tells how the foundation, a non-profit institution, renders research and experimental service to industry.

Wire Staplers 21

Numerous novel applications of wire stitching and stapling are illustrated in a broadside from Bostitch. Other folders available include B-175 on bag sealing, B-182 on heavy duty hand operated staplers, and B-132 on bottom sealing devices.

Families and Stores 1945 Census..22

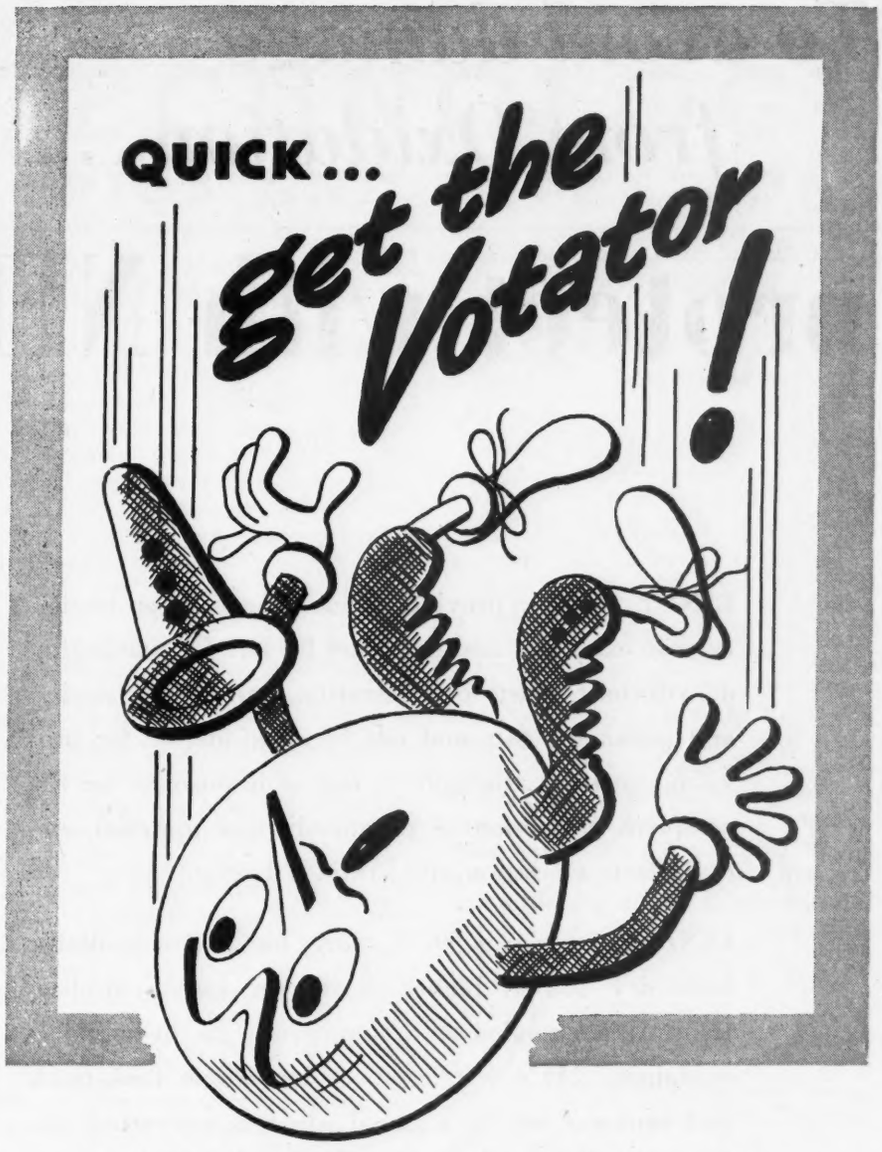
The New York Times has just released the 1945 census of New York families, food stores, drug stores, and liquor stores. The book is entitled "Blueprint for Sales." The census is a compact, easy to use, analysis of the retail outlets of distribution handling foods, drugs and liquor. The announcement also includes a study of the ultimate consumer, the family as a buying unit.

Auger Packers 23

A four-page bulletin, describing an improved auger packer for packaging powdered materials, has been issued by Triangle Package Machinery Co. Illustrations show method of operation and describe the new automatic filling feature whereby the machine starts filling the container as soon as it is placed in position.

Protective Packaging 24

Waterproof paperlined textile bags are featured in a 12-page book which has just been issued by the Bemis Bro. Bag Co. These bags are used as containers for "hard to pack" products and for export shipments. They protect against dust and gases and prevent change of moisture content, and are sift-proof and insect-proof. Aromas are retained and all undesirable odors excluded.



"... *instead of trying to put Humpty Dumpty together again, they pasteurized him in the Votator.*" Thus the nursery rhyme might read in line with the modern way of processing liquid whole eggs.

A VOTATOR unit measuring only 4′ x 6′ 3″ raises the temperature of this product from approximately 40°F to 140°F in 15 seconds, on a continuous basis, to pasteurize 2500 lbs. of eggs per hour. Higher temperatures without coagulation are made possible by the exclusive VOTATOR heat transfer principle. Bacteria count is reduced to a minimum preventing development of off-flavors before drying or fast-freezing can be accomplished. The entire operation is closed and under mechanical control and uniform quality is assured.

Margarine, shortening, lard, wine, plastic cream, fruit puree, starch paste ... continuous, closed VOTATOR operation is proving highly advantageous for many foods which are processed in a viscous state and require heating and/or cooling. Write to The Girdler Corporation, Votator Division, Louisville 1, Kentucky. District offices: 150 Broadway, New York 7, N. Y.; 619 Johnston Bldg., Charlotte 2, N. C.; 2612 Russ Bldg., San Francisco 4, Calif.

THE Votator
A GIRDLER PRODUCT

VOTATOR—
T. M. Reg. U. S. Pat. Off.

To avoid damage from Oxidation . . .

protect with NITROGEN

LINDE Nitrogen provides an ideal means of protection against oxidation and corrosion by air. For packaging dehydrated foods; for deaerating, processing, storing and packaging fats and oils of all kinds; or for providing an inert atmosphere, free of impurities, for the complete protection of practically any material susceptible to oxidation, use LINDE Nitrogen.

LINDE Nitrogen is 99.7% pure, but is also available bone dry and at higher purity for special applications. It is supplied as a compressed gas in cylinders containing 244 cu. ft. each, or in bulk in tank-truck and tank-car lots as a liquid which is converted into gaseous nitrogen as required. LINDE Nitrogen in bulk offers remarkable savings in cost and eliminates cylinder handling.

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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

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FATS AND OILS

Tannins Improve Fats

IMPROVEMENT in the keeping quality of edible fats can be brought about by treatment with tannin and the removal of the tannin and/or tannin compound. Animal fats are improved to a greater extent than vegetable fats due to the fact that more prooxidants are removed from them and that the fatty acid constituents are, in themselves, less prone to be oxidized than those of peanut or cottonseed oils.

Lards, peanut and cottonseed oils, hydrogenated vegetable shortenings and butterfat were treated with U.S.P. tannic acid, containing less than 22 percent moisture, at 160 deg. F., diatomaceous earth was added and the fat filtered off. Controls were heated to 160 deg. F., diatomaceous earth added and the fat filtered off. Ferric chloride tests for the presence of tannic acid, active oxygen tests for keeping quality, and Lovibond tintometer tests for color were run. Data are presented on the improved keeping quality of the various fats, on the effect of varying temperatures at which the treatments were made, and upon the effectiveness of various samples of commercial tannins. The color, the flavor, and the odor of the fats were not affected adversely by treatment with any of the tannins.

Digest from "Improvement of Keeping Quality of Edible Fats by Some Commercially Available Tannins," by H. T. Spannuth, T. H. McGuine and G. A. Crapple, *Oil & Soap*, vol. 13, 110-113, April, 1946.

CANNING

New Machine Indicates Stage of Corn Maturity

AN instrument has been developed at the University of Maryland, known as the succulometer, for measuring the maturity of raw and canned whole kernel corn based on the quantity of extractable juices. It is equal in accuracy to a reliable moisture test on the raw product, and alcohol insoluble solids content on the canned product, but is simpler to operate, and results may be obtained in a few minutes. In its present form it is simple to construct, but further improvements in the machine may be desirable.

Before testing, the samples are prepared as follows:

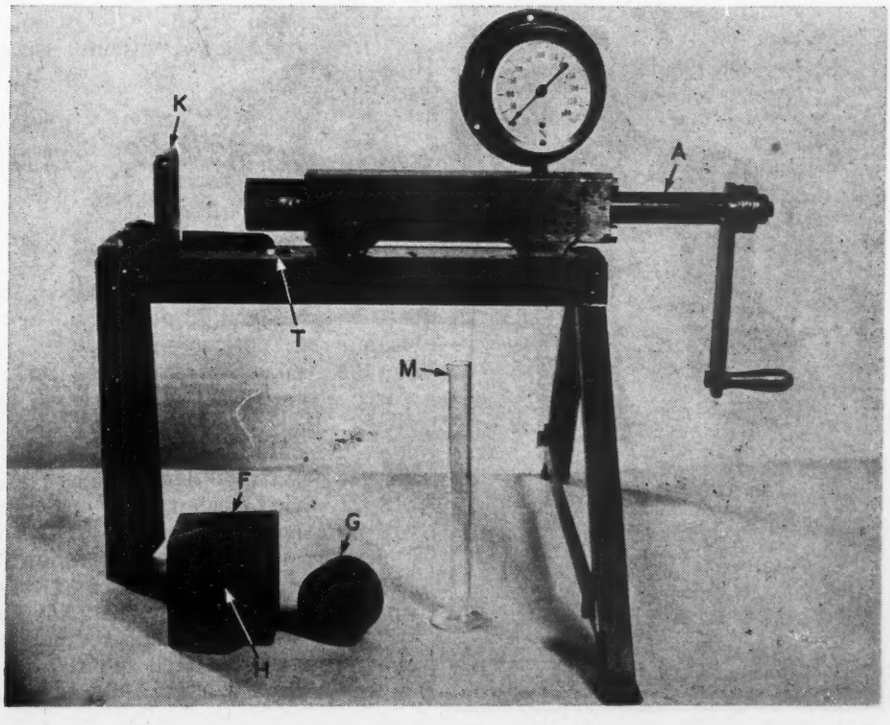
Canned whole kernel corn: Pour off the liquid, wash contents of can with twice the volume of water, spread evenly over an 8-mesh screen, 8 in. in diameter, and allow to drain for 2 minutes, then weigh out a 100 g. sample.

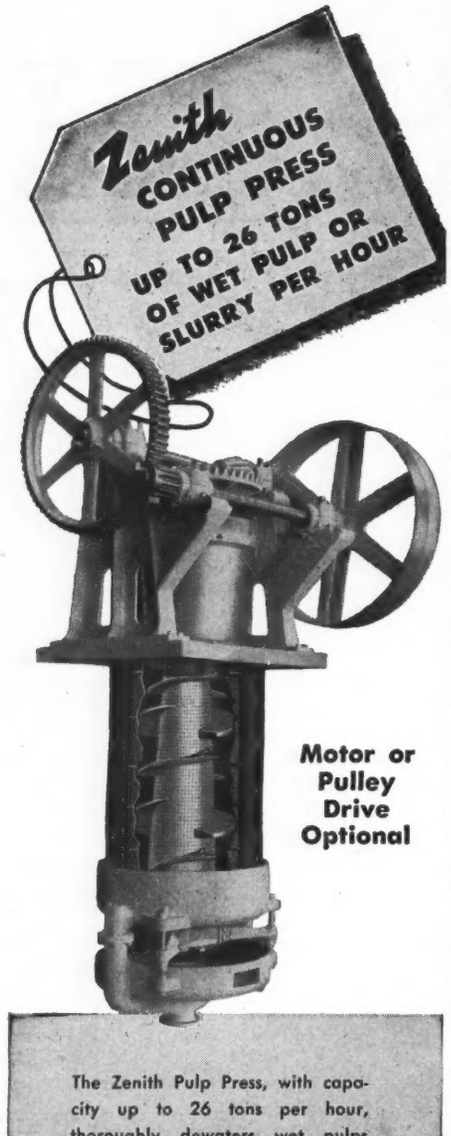
Raw corn: Obtain representative ears. Cut with whole-grain cutter. Soak and stir cut kernels in twice their volume of water for 5 minutes. Transfer a No. 2 canful to an 8-mesh screen, 8 in. in diameter. Allow to drain for 2 minutes and then weigh a 100 g. sample.

To conduct the test: (1) Transfer the sample to chamber *H*. Insert plunger *G*, and put the sample unit *F* in position against backstop *K*. (2) Place cylinder *M* in position to catch drip from *T*. (3) Turn handle on screwrod *A* rapidly until a pressure of 500 lb. is indicated on gage. Maintain pressure for exactly 3 minutes. The volume of liquid drained into cylinder *M* is the measure of maturity. As the maturity advances the amount of liquid decreases.

The tests are not applicable to cream-style corn, and the limits for vacuum-packed corn should be lower than those for brine-packed corn. It is suggested that the individual canner establish for each variety the relation of the succulometer values on the raw product, or anywhere along the line, to the values obtained for the canned product. Once these relationships are established, it will be possible for him to predict accurately, as well as to check, the final maturity of his canned product.

Digest from "Scientific Contribution of the Labeling Committee, National Canners Association; Scientific Paper No. A131, Contribution No. 2020 of the Maryland Agricultural Experiment Station," by A. Kramer and H. R. Smith, May 20, 1946.





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The Zenith Pulp Press, with capacity up to 26 tons per hour, thoroughly dewaters wet pulps and slurries such as:

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Heavy screw-type spindle applies smooth, continuous pressure, forces pulp or slurry against selective resistance. Rifled drilled resistors permit use of steam when necessary. Minutely perforated screens assure efficient drainage, hold pulp losses to minimum. Ball thrust bearings and oversize shaft bearings reduce power load.

New uses for the remarkably efficient, profitable Zenith Pulp Press are being constantly developed. An experimental press is available for trial in your plant.

Write for full information.

JACKSON & CHURCH CO.
SAGINAW, MICHIGAN

VITAMINS

A New Vitamin A

NEO VITAMIN A has been isolated from shark liver oil. It forms yellow needles melting at 140 deg. F., whereas vitamin A crystallizes in yellow prisms melting at 147 deg. F. The two vitamins differ slightly in their ultraviolet absorption spectrum and in their stability. Neo vitamin A forms a red anthraquinone carboxylate ester while the corresponding ester of vitamin A is yellow.

They are further sharply distinguished by the difference in their rate of reaction with maleic anhydride. A method for determining the amount of neo vitamin A in fish liver oils was based on this observation. Using this assay method, it was shown that in cod liver, shark liver, and dogfish liver oils, a mixture of the two vitamins is present in the proportion of approximately 35 percent neo vitamin A and 65 percent vitamin A.

The new vitamin was isolated from the oily residue left from shark liver oil unsaponifiable matter after as much vitamin A as possible had been crystallized at low temperatures. It was first separated from the contaminants by crystallizing its phenylazobenzoate ester. After recovery from the ester it was crystallized from a solvent at low temperatures.

A study of the chemical structures indicated that neo vitamin A and vitamin A are geometrical isomers. It was found that the configuration about the double bond nearest the hydroxyl group was "cis-" in neo vitamin A and "trans-" in vitamin A. Otherwise the two vitamins were identical.

Digest from "A New Vitamin A," by C. D. Robeson and J. G. Baxter, read before the Division of Biological Chemistry of the American Chemical Society, Atlantic City, N. J., April 11, 1946.

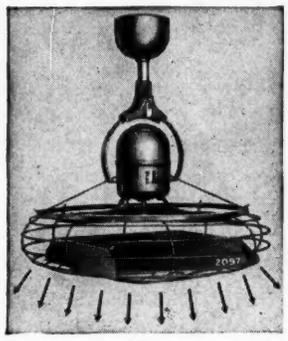
Vitamin A in Dried Eggs

DRIED EGGS, packed in sealed tin cans, retain about 75 percent of their vitamin A potency regardless of storage temperature. Dried eggs stored either loose or compressed in waxed fiber cartons retain about twice the potency at 68 deg. F. that they retain at 100 deg. F.

Spray-dried fresh midwestern eggs with a moisture content of less than 5 percent were packed as follows: (1) Loose in sealed tin cans, (2) loose in waxed fibre cartons, and (3) compressed in waxed fiber cartons, and stored at 32, 50, 68 and 100 deg.

(*Turn to Page* 192)

DON'T FEED FLIES!



Reco FLY CHASER FANS

Prevents flies from entering a building and so avoids the labor, dirt and expense of fly sprays, swatters, etc. The RECO when installed over an entrance or other opening, blows a large volume of air downward, forming an invisible screen of air which flies do not pass through. People can come and go as they will, but the flies stay outside.

Write for Bulletin 230 giving installation diagrams, charts and complete information.

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Mfrs. of Refrigerator Fans, Fly Chaser Fans, Air Circulators, Food Mixers and Vegetable Peelers.

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Plasmolyzed Yeast Extracts for FOOD and AMINO ACID PREPARATIONS

Vi-Co Plasmolyzed Yeast Extracts are prepared by enzyme digestion of brewers' yeast to yield a B complex product rich in essential amino acids. Amino acids provide the necessary "building blocks" for healthier and stronger bodies.

These products possess a definite "meat-like" flavor useful in enriching soups, bouillon cubes, tomato juice and other packaged foods. Such enriched foods are also of value for their natural B complex and high amino acid composition.

Consult us about your vitamin or yeast problems. Our technical staff can best advise you how Vi-Co products can be used to enrich your own products.

VICO PRODUCTS CO.
415 W. Scott St. • Chicago 10, Illinois

help you SELL spaghetti and noodle products?

...and wouldn't statements similar to these help the manufacturers of numerous other products?

In the box above the illustration on the left-hand page are two statements you may be able to make about *enriched* macaroni and noodle products.

These statements should be of particular interest to manufacturers of these specific products—in view of the fact that the proposed definitions and standards for enriched macaroni and noodle products may soon be in effect.

At the time this is written the proposed definitions and standards (published in the May 14, 1946 issue of Federal Register) have not become effective.

But, manufacturers of *other* food products should be interested in such statements, too. *More* fortified foods mean more nutritional help for all America.

If there are no definitions and standards under which your food product is made, you may fortify it without hesitation.

Your company—whether it manufactures macaroni products or *other* food products—may have plans under way for further fortification of foods.

Standard Brands Incorporated has spent much time and research in recent years developing products for vitamin B-complex, vitamin D and protein supplementation of foods. These products are known for their dependability and uniformity.

If you are now seeking ways of fortifying your company's products, we invite you to discuss your needs in confidence with one of our executives.

Products containing
VITAMIN D

Fleischmann's Hy-Dee
Irradiated Dry Yeast

Fleischmann's Irradiated Dry Yeast
Type 700-H

Standard Brands Viosterol
(Activated Ergosterol) Steenbock Process

Products containing
NATURAL B COMPLEX FACTORS

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Pure Dry Primary Yeasts *(Brewer's Strain)*

Fleischmann's
Bee-Flex Products

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for
FOOD PRODUCT PACKAGING

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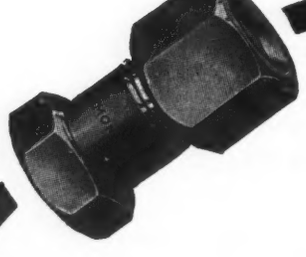
Waste Paper is a Vital Raw Material . . . SAVE IT . . .

WANTED: YOUR SPRAY PROBLEMS!



DO YOU WANT TO:
Wax Fruits?
Rinse Vegetables?
Powder Milk?
Dry Eggs?
Wash Filter Cake?
Humidify Banana Rooms?

Monarch Spray Nozzles are doing these and innumerable other Food Processing jobs. If your liquid can be sprayed with direct pressure Monarch can supply the nozzles.

Outline your problem so that we may make recommendations.

Send for Catalogs 6-A and 6-C.

MONARCH MFG. WORKS, INC.
3307 Salmon St. Philadelphia 34, Pa.

F. for six months. The vitamin A values were determined by the usual rat-growth method. Results were as follows: Loose pack, 32 deg. F. 80 percent, 50 deg. F. 74 percent, 68 deg. F. 69 percent, and 100 deg. F. 30 percent. Compressed, 71, 66, 62 and 30 percent, respectively. Sealed cans, 72, 77, 70 and 75 percent, respectively. Compressing the dried eggs prior to packaging failed to have any beneficial effect.

Digest from "Vitamin A Retention in Dried Eggs as Affected by Compression and Packaging in Tin Cans," by B. B. Bohren and S. M. Hague, *Food Research*, vol. 11, 39-40, January-February, 1946.

CEREAL PRODUCTS

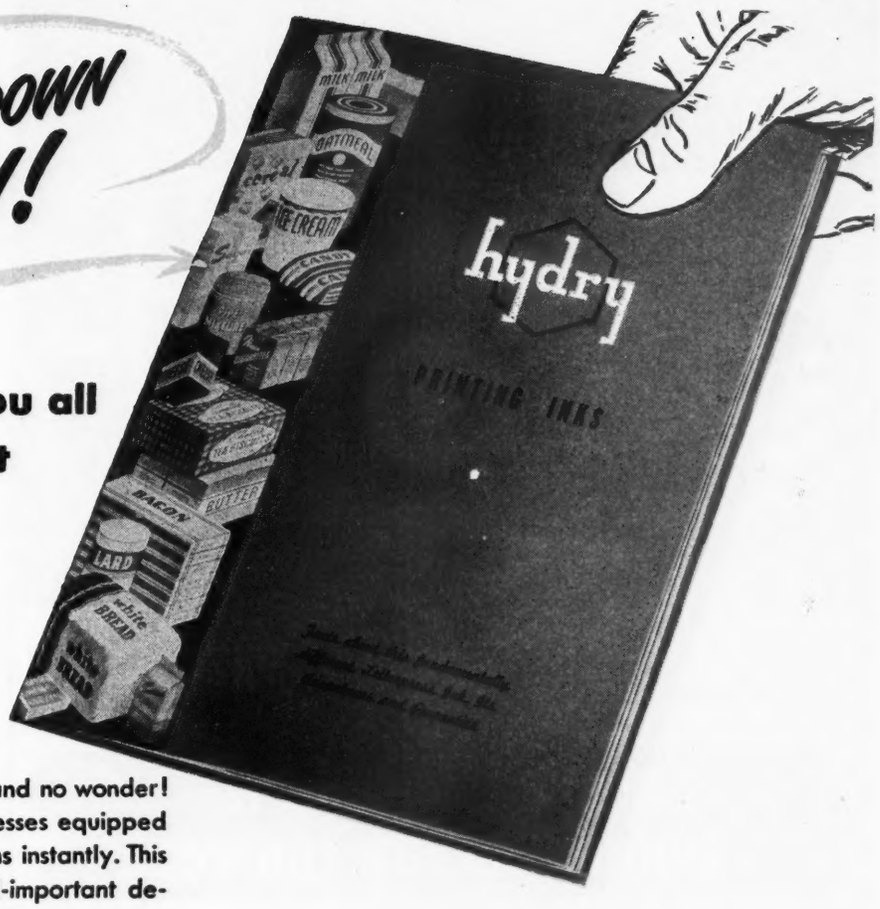
Enrichment of Rice

PREFERENCE for white rice, and the fact that rice is universally washed before cooking, require a form of enrichment that does not contribute appreciable color, and will not wash off.

The Roche method satisfies these requirements. Because of its yellow color riboflavin is excluded from the treatment but thiamin, niacin and iron (as a pyrophosphate mixture) are included. In a rice miller's "trumbol," a horizontal rotating drum, a charge of rice is sprayed with the vitamin solution and dried by a current of preheated air. Next a layer of coating solution is applied, followed by the iron pyrophosphate mixture and another layer of protective coating. The enriched "premix" contains 500 mg. thiamin, 3,200 mg. niacin, and 2,600 mg. iron per lb. and is added to ordinary white rice at the rate of 1 to 200, either in a trumbol or any suitable mixer. When "premix" and unenriched rice of the same type are compared, the treated grains cannot be identified by usual inspection. By treating with iodine, the untreated grains turn blue, while the protective coating of the treated grains resists penetration and remains white. This is used as a control measure in blending "premix" with unenriched rice. Similar treatment with an iron reagent colors the treated grains red-brown, making them stand out.

The treated grains resist loss of their enrichment by washing when measured by either the S. C. test for enriched grits, or by the more drastic Roche method. About 10 percent of the thiamin, 25 percent of the niacin, and 10 percent of the iron are lost in 5 minutes of washing by the latter method. These losses are almost entirely from the white rice; the losses from the treated or "premix" grains are very small.

GET THE LOWDOWN ON HYDRY!



New booklet gives you all the information about

—BRILLIANT QUICK-DRYING ODORLESS INK

The news of HYDRY is spreading fast—and no wonder! For here is a *moisture-set* ink that on presses equipped with steam applicators dries and hardens instantly. This new booklet tells you all about this all-important development in package printing . . . shows you simply and directly by text and picture how it eliminates many food, confectionery and tobacco packaging problems.

Developed by Michigan Research Laboratories, subsidiary of Sun Chemical Corporation, HYDRY speeds production. No more waiting days or weeks for ink to dry. Waxing, folding or die-cutting operations can be started as soon as sheets come off the press.

And HYDRY is absolutely odorless—no residual ink odors to affect milk, cheese, butter, shortening, meat, cakes, breads, cereals, ice cream, sugar, flour, chewing gum, candy, tobacco or any one of numerous other products. Prints bright and clean, in a full range of brilliant colors.

Write on your letterhead for this new booklet.

Check your package-printing problems against these HYDRY features

Fast Drying—Dries on most stocks in 10 to 30 minutes; on presses equipped with steam applicator, dries *instantly!*

Odorless—Finished prints entirely devoid of ink odor.

Brilliant Colors—Ink film reflects light, gives superior brilliance and cleanliness.

Non-Offset—Possibilities of offset reduced to a minimum.

Non-Smear—Dry-hard finish extremely resistant to rubbing and smearing.

Non-Crystallizing—Can be overprinted, even after several weeks.

Sharper Printing—Does not spread or bleed.

Folding Qualities Improved—Affords better moisture content in paper stock.

Improves Heat-Sealing of Waxed Wrappers—Will not mix with wax film during heat-sealing operations.

hydry

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GENERAL PRINTING INK COMPANY DIVISION

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American Printing Ink • Eagle Printing Ink • Fuchs & Lang • Geo. H. Morrill • Pacific Coast • Sigmund Ullman
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The Answer is one of 11 reasons Why You Should Use

MM&R SPICE OILS for MODERN FLAVOR CONTROL

Two lbs. of Oil Thyme MM&R is the equivalent of 100 lbs. of dry spice. So of course you conserve storage space, facilitate handling, when you use Spice Essential Oils. In addition, bottled Spice Oils assure against the introduction of foreign bacteria or other contaminating substances.

And that's not all—highly concentrated Spice Essential Oils are more economical . . . provide uniform distribution of wholesome flavor without color disturbance.

These are just a few of the 11 reasons why more and more producers of food products are switching to Spice Essential Oils . . . *the MM&R brand* . . . pacesetter in the field of Spice Oils for the food industry.

1. Uniformity of quality and flavoring
2. No color disturbance
3. Less bulk in storage
4. Less weight in shipping
5. No danger of molding
6. No loss by exposure in package while being stored
7. No starch introduced into your mixture
8. Ease of handling
9. Less cost as compared to equivalent spice value
10. Entire flavor available immediately
11. Elimination of the possibility of dust and dirt

Send for "Table of Equivalents" Showing Comparative Flavoring Strengths of Whole Spices and Spice Oils

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Los Angeles: Braun-Corp. • Seattle, Portland, Spokane: Van Waters and Rogers, Inc.
San Francisco: Braun-Knecht-Heimann Co. • Canada: Richardson Agencies, Ltd.

Losses in vitamins in cooking rice are not serious if water used is entirely absorbed and none is drained off and discarded. When cooked by the army method (all cooking water absorbed) about 90 percent of the initial vitamin B_1 is conserved. Losses are less in a double boiler than over an open flame. Vitamins of the premix are completely available, both to rats and to human beings.

Digest from "Enrichment of Rice with Synthetic Vitamins and Iron," by M. F. Furter, W. M. Lauter, E. DeRitter, and S. H. Rubin, *Industrial and Engineering Chemistry*, vol. 38, No. 5, 486-493, May, 1946.

ENGINEERING

New Type Smokehouse

A TUNNEL smokehouse with an output of 3,000 lb. of smoked fillets per nine hour day has been designed for the smoke curing of fish as carried out along the Canadian Atlantic seaboard. The design is one that could be readily adapted to other smoking or food drying processes.

The unit is 14 ft. long, 8½ ft. wide and 5 ft. 3 in. high, not including stack and external fans, ducts and motors. Dehumidified air, mixed with smoke from a cone smoker burning sawdust, is drawn into the bottom of one side near the center. A 42-in. propeller type fan, handling about 6,000 cfm., circulates the air-smoke mixture. The direction of air flow is regulated by vertical wooden louvers set in a diagonal row in the end sections.

Two trucks of trays are handled in each drier unit, one in the middle of each side, so that the air flows through the circulating fan across the fan-end section, through the first set of louvers across the first trays on truck No. 1, across the other end section and through the second set of louvers, across the second trays on truck No. 2, and into the circulating fan. As the air passes the second truck, an exhaust fan on top of the unit removes about 2,000 cfm., the amount being controlled by a hand damper. At the same time, fresh air and smoke is drawn in at the bottom and into the circulating fan so that before the air-smoke mixture reaches the first truck of trays it is well mixed with the residual air and any dirt and tarry particles are dropped in the end section of the unit. By adding a fresh truck of fish after half the drying period has elapsed, the direction of flow across the trays can be reversed to get equal treatment of all parts of each tray.

It is not necessary to support the

The HAM WRAP that made HAM HISTORY

There's no room for guesswork in packaging Foods
(No. 3 of a series)

Not so long ago, one ham looked a good deal like another. But Bohack's Baked Ham was a better ham and cost a lot more to process . . . so, naturally, it had to sell for more than ordinary ham.

Today, wrapped in Cellophane with a design in four colors and gold, beautifully printed in Colodense by Shellmar, Bohack's Baked Hams command a market commensurate with their quality.

Excellence of production in Shellmar packages is not the result of guesswork. Specially designed equipment for gravure, aniline and letterpress printing, our own ink plant and engraving department, our extensive research and laboratory facilities . . . all contribute to Shellmar's ability to design and produce packages of outstanding functional beauty.

If you have a merchandising problem which packaging may solve, chances are you'll find the RIGHT answer . . . QUICK . . . at Shellmar.

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PRODUCTS CORPORATION
MOUNT VERNON, OHIO SOUTH GATE, CALIFORNIA
Sales Offices in New York, Chicago, Los Angeles and other principal cities

PACKAGE MANUFACTURER • PRINTER • LAMINATOR • CONVERTER...CELLOPHANE • PLIOFILM • ACETATE • SARAN • VINYLS • FOILS • PAPERS • COATINGS

ONE OF THE WORLD'S LARGEST FOOD PROCESSORS RELIES ON

NUKEM ACID-PROOF FLOORS

THE photograph above shows a NUKEM acid-proof floor being installed in a large food plant. NUKEM acid-proof brick and jointing compound will make the floor immune to lactic and acetic acids, vegetable and fruit juices, sugars, fats and corrosive cleaning compounds. In addition, NUKEM acid-proof floors are leak-proof, wear-proof, attractive and easy to keep clean.

There is a NUKEM jointing compound to meet every type of floor requirement. The type of compound used depends on the conditions to which the floor is subject. Canneries, Dairies, Packing Plants, Cheese Plants and other food processing industries have eliminated repairs and maintenance by installing NUKEM floors.

Ask to have a NUKEM engineer recommend the type of floor to suit your requirements.

NUKEM Products CORP.
108 COLGATE AVE., BUFFALO 20, N. Y.

fish on rods or hooks. The trays are wire mesh, paraffined, and the fish are simply laid on the wire, skin side down, so that wire marks do not show on the smoked fish.

Smoke density is controlled by projecting a beam from a 150 w. projector lamp through about 40 in. of smoke stream onto a foot-candle meter. To eliminate variations in intensity, the beam from a 60-w. lamp is used as a standard of comparison at the time readings of smoke density are made.

In typical runs on the unit, 800 lb. of cod fillets were smoked 2½ hours at a dry bulb temperature of 76 deg. F. and relative humidity of 70 percent, 1,000 to 1,400 cu. ft. of air being exhausted per minute. The average weight loss, determined by weighing trays of fish, was 11.4 percent. All of the fish packed out first quality. The output per cu. ft. per hr. is about 50 times that of the usual smokehouse.

Digest from "The Cross-Ventilated Tunnel Smokehouse," by E. L'nton and A. L. Wood, *Canadian Journal of Research*, vol. 24, Sec. F, 81-90, January, 1946.

DAIRY

Propionate for Mold

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Digest from "Prevention of Mold Growth on Surface of Cheese," by L. M. Dorsey, *Maine Agricultural Experiment Station Bulletin* 438, 638-39, June, 1945.

Quick Frozen Cream

FREEZING is a well-known method of breaking emulsions. It is no surprise then that high-fat cream used for frozen storage is not always a stable product. Any factors which increase the size of the fat globules or cause clumping lead to instability. The following contribute to the physical stability of frozen cream: (1) the use of freshly drawn milk, which contains small, unclumped fat globules, (2) maintenance of these globules in a fluid, completely dispersed state until freezing time, (3) quick freez-

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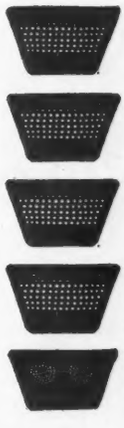

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ing to retain this degree of dispersion and (4) a storage temperature sufficiently low to prevent the physical changes, which cause localized crowding, distortion and disruption of the fat globules and consequent oiling off on thawing. Quickly frozen cream that does not oil off is homogenous and has a low viscosity after brief storage, will retain its physical properties throughout a long storage period if a sufficiently low temperature (minus 20 deg. F.) is maintained.

Digest from "Factors Which Contribute to the Physical Stability of Frozen Cream," by R. W. Bell and C. F. Sanders, *Journal of Dairy Science*, vol. 29, 213-220, April, 1946.

STORAGE

Darkening of Apricots

DARKENING of dried apricots during storage is accelerated by oxygen and may be decreased by reducing the proportion of oxygen to fruit. Less than 15 mg. of oxygen per 100 g. of dried fruit causes no noticeable damage. This oxygen level can be produced by tight fill of cans and vacuum packing.

Oxygen converts part of the sulfur dioxide to sulfate and at storage temperatures below 107 deg. F. deterioration is largely due to this reaction. Above this temperature a non-enzymatic oxygen uptake uses most of the oxygen. The rate of oxygen uptake is independent of the SO_2 level, but the rate of sulfate formation increases with increasing oxygen tension indicating that the oxidation to sulfate occurs in the fruit and not in the gas phase. Fruit of 25 percent moisture consumes oxygen about ten times as fast as fruit with 10 percent moisture.

Carbon dioxide is produced non-enzymatically at a rate proportional to the degree of darkening. Its formation varies with temperature, concentration of SO_2, oxygen pressure, and to a minor extent, with the moisture of the fruit.

CO_2 production is responsible for smells of dried apricots packed in sealed cans. Pressure development is favored by low SO_2 content, tight packing or packing in an inert gas such as nitrogen. When fruit is packed in air, oxygen absorption is faster than CO_2 production. Due to these compensating effects there may be no formation of swells until after the fruit is inedible, if the ratio of oxygen to fruit is greater than 20 ml. per 100 g.

Temperature is the most important factor affecting oxygen consumption, CO_2 production, SO_2 loss,

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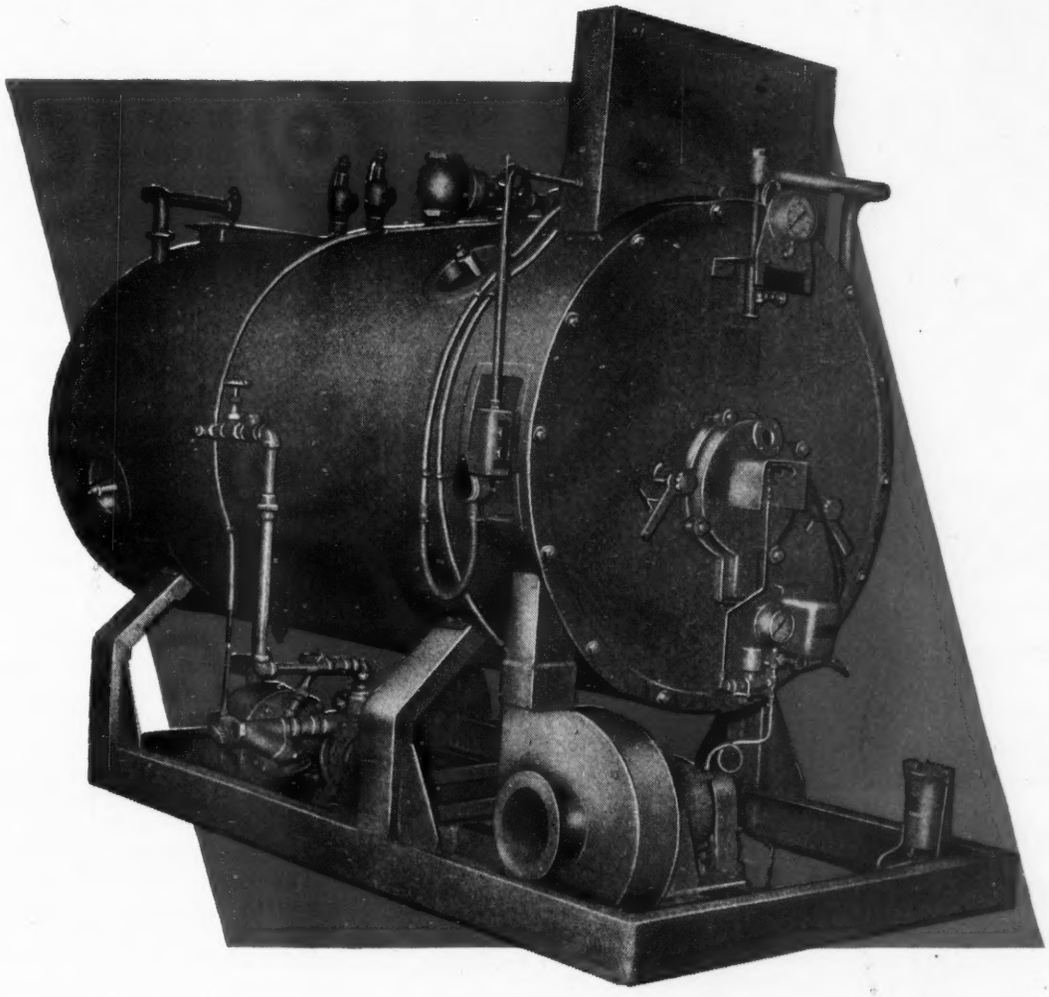

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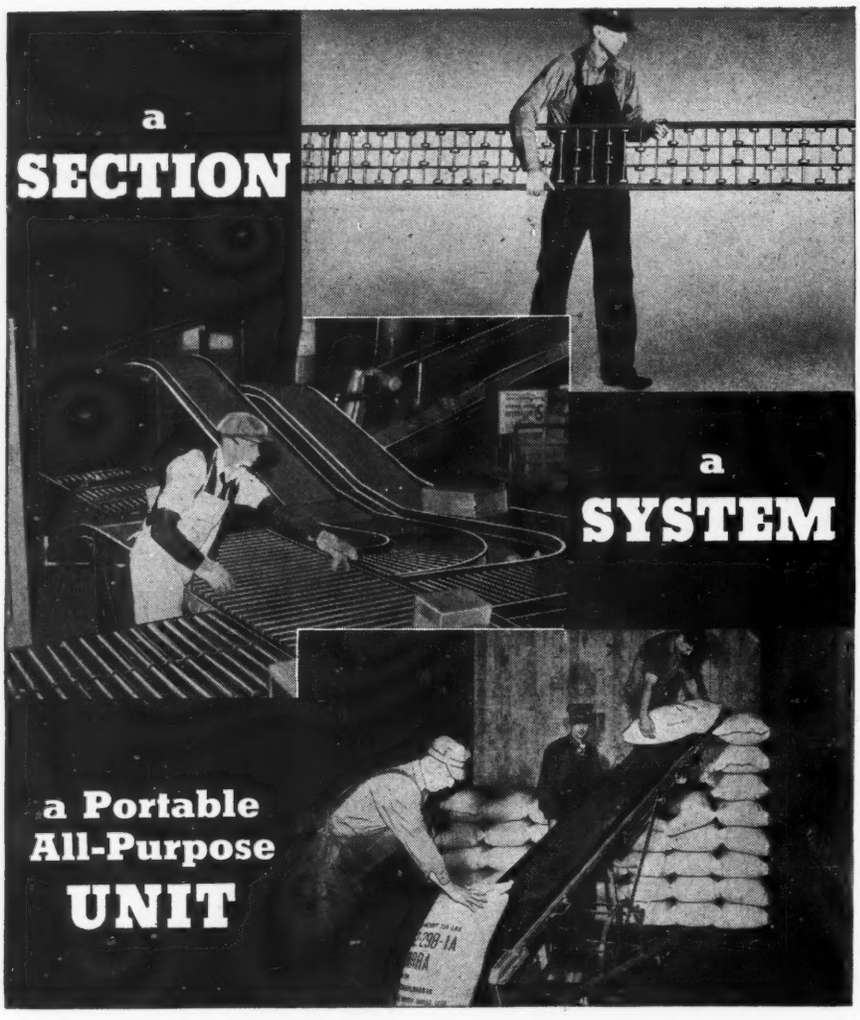

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and darkening. Their rates increase about 4 times for an 18 deg. rise in temperature between 72 and 120 deg. F.

Digest from "Storage of Dried Fruit. Gas Changes During Storage of Dried Apricots and Influence of Oxygen on Rate of Deterioration," by E. R. Stadtman, H. A. Barker, V. Haas, E. M. Mrak and G. MacKinney, *Industr al and Engineering Chemistry*, vol. 38, 342-9, March, 1946.

Keeping Quality of Egg and Milk Mixtures

EGG and milk mixtures have been dehydrated for use in preparation of ice cream, custards, milk shakes and similar foods, but there is evidence that such dry mixtures have poorer keeping quality during storage than either component dried and stored separately.

Six mixtures of skim milk, whole milk and eggs were dried in a spray-drier to 2 to 4 percent moisture. In addition, three were dried with 3 percent of lactose or 3 percent of sucrose since these sugars are believed to improve keeping quality of milk and eggs on dehydration. Samples were sealed in tin cans with air in the head space and stored at 40, 60, 80, 120 and 140 deg. F. Some samples were stored in carbon dioxide at 80 deg. F. Quality was determined by reconstituting as a milk shake made up to a sweetness level equivalent to 7 percent sucrose and comparing with a freshly prepared mix of whole milk powder, skim powder, and whole egg powder.

The results indicate that all the mixtures containing egg spoiled more rapidly above 80 deg. F. than those containing milk alone. There was a slight protective action resulting from added sugar. Sucrose was more effective than lactose, but the temperature effect with added sugars was irregular. Carbon dioxide atmosphere afforded some protection over air in the container head space, but there was little or no difference between the two gases with products of high-fat and high-protein content. The beneficial effect of carbon dioxide over air was not very great, only about two palatability units after 16 weeks of storage.

Fluorescence of the products increased with time and temperature of storage and was slightly reduced by addition of sucrose, but fluorescence changes did not correlate well with palatability changes. The fluorescence measurement also indicated that sucrose was more effective than lactose.

Digest from "The Keeping Quality of Dehydrated Mixtures of Egg and Milk," by J. A. Pearce, J. Whittaker, H. Tessier, and W. A. Bryce, *Canadian Journal of Research*, vol. 24, Sec. F., 70-76 January, 1946.

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BOOKS

Biochemical Developments

CURRENTS IN BIOCHEMICAL RESEARCH. Edited by David E. Green. Published by Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y., 1946. 6½x9½ in.; 486 pages; cloth. Price, $5.00.

The efforts of some 30 contributors have gone into the making of this volume, which is designed to bring biochemistry into clearer perspective in its many relations to other fields of inquiry, principally biology, chemistry and medicine. Dealing with agriculture, public health, pharmacology, chemotherapy, genetics and photosynthesis, on the one hand, and with considerations of organic, analytical and physical chemistry, on the other, the authors have aimed at a simple, provocative presentation.

The book is more than a review, however, as the contributors attempt to speculate on the most likely paths of future development in biochemical research in their presentation of developments in their particular fields.

British Review

INDEX TO THE LITERATURE OF FOOD INVESTIGATION. Vol. 16, No. 1, June, 1944. Compiled by the Department of Scientific and Industrial Research (London). 6x9½ in.; 76 pages; paper. For sale by British Information Service, 30 Rockefeller Plaza, New York 20, N. Y. Price, $1.35.

The war delayed abstracting work as well as publication. This issue of the British abstract journal, which appeared only recently, carries many digests of the literature of 1939 to 1943. The usual standards of readability and thoroughness have been maintained, but apparently the abstractors have not yet covered many German periodicals.

Foreign Trade

INTERNATIONAL TRADE HANDBOOK. Published by the Committee for Economic Development, 285 Madison Ave., New York 17, N. Y., 1946. 8½x11 in.; 100 pages; paper. Price, 50 cents.

Following its adopted pattern of treating separately the various aspects of the general business picture, the CED considers here the practical steps to which a business man should give consideration—whether he is already engaged in international trade or just planning to enter that market. The book is divided into sections dealing with special problems of the manufacturer, the wholesaler, the jobber and the retailer.

The CED, with a membership covering most of the country's business leaders, has entrusted this task to its International Trade Committee.

Small Businesses

A BUSINESS OF MY OWN. By Arthur E. Morgan. Published by Community Service, Inc., Yellow Springs, O., 1946. 6x9 in.; 184 pages; paper. Price, $1.00.

This book should help the already established small food plant operator as well as any who are considering the launching of such a business. Except for one chapter, the book is not specifically concerned with the food industry. In that one chapter, however, the author does establish the fact that despite highly competitive conditions there are still many opportunities, particularly among the special products.

The opportunities and possibilities in various industries and in various localities are discussed at length. Moreover, the author's outlook for small business should be highly encouraging to those who fear the pressure of "big business."

Encourage Invention

THE INVENTORS' MAGNA CHARTA. By Edwin Hopkins. Published by Edwin Hopkins, 255 W. 43rd St., New York 18, N. Y., 1946. 4½x6½ in.; 268 pages; paper. Price, $3.00.

The food industry is as much concerned with the fostering and protection of patents as any industry in our economy. It is largely upon invention, either of processes or equipment, that individual companies depend for survival in their highly competitive field.

This book, while covering the whole controversial field of patent protection, is not restricted to simple legal protection. The author not only points to the restraint put upon invention by many of our present business practices, but also shows how the present rules of the Securities and Exchange Commission fail to correct the situation.

Whether or not you agree with the methods proposed for adequately rewarding the inventor, it will be difficult to reject the author's implied contention that our present day inventors are often shabbily treated or dangerously neglected.

GOVERNMENT PUBLICATIONS

PROGRESS IN TESTING THE RELATIVE EFFECTIVENESS OF NEW ORGANIC FUNGICIDES IN THE CONTROL OF PLANT DISEASES. Prepared by the Fungicide Committee. The American Phytopathological Society. Unnumbered mimeographed. Order from H. P. Barss, Office of Experiment Stations, USDA., Washington 25, D. C.

FARM PRODUCTION, DISPOSITION, AND INCOME FROM MILK, 1944-45. Unnumbered mimeographed. Available on request to Bureau of Agricultural Economics, Washington 25, D. C.

CONFECTIONERY SALES AND DISTRIBUTION—1944. Industrial Reference Service, Part 5, Foodstuffs, Fats and Oils. Vol. 4, No. 7. Available from Superintendent of Documents, Washington 25, D. C. Price, 5 cents.

WORLD TRENDS IN MAJOR OIL CROPS. By Peter L. Hansen. Processed. F. M. 54. Available on request to Bureau of Agricultural Economics, Washington 25, D. C.

WORLD FOOD SITUATION—1946. Unnumbered mimeographed. Available on request to Office of Foreign Agricultural Relations, USDA., Washington 25, D. C.

WALSH-HEALEY PUBLIC CONTRACTS ACT. Rulings and Interpretations No. 3. Department of Labor. Available from Superintendent of Documents, Washington 25, D. C. Price, 15 cents.

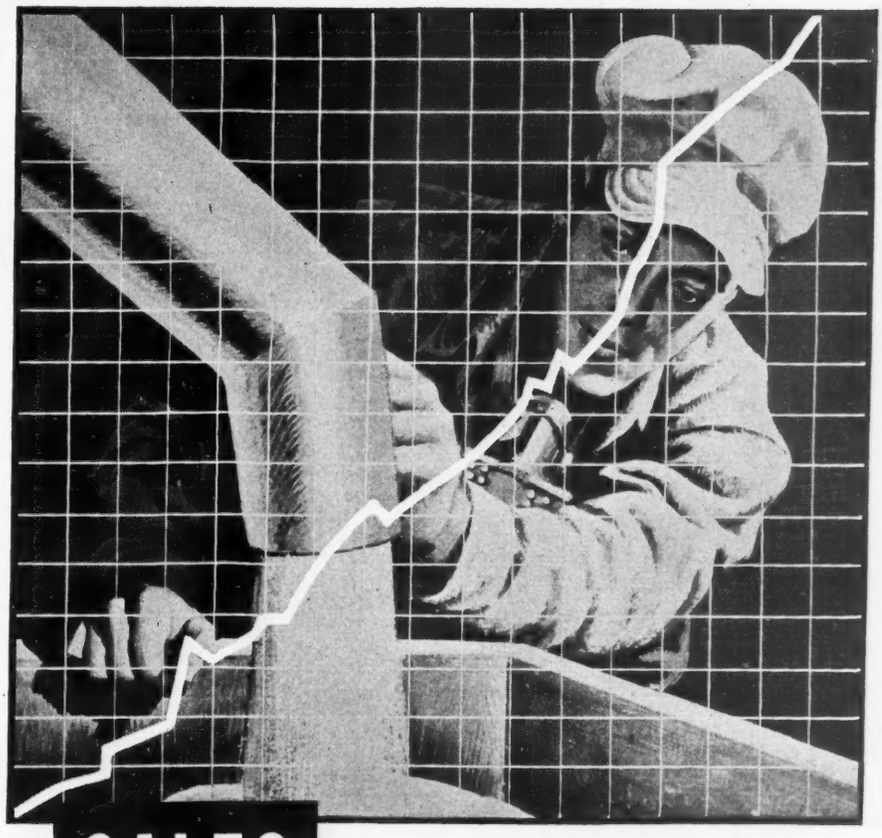
REPORT ON THE AGRICULTURAL EXPERIMENT STATIONS, 1945. By J. T. Jardine, et al. Available from Superintendent of Documents, Washington 25, D. C. Price, 20 cents.

ANNUAL REPORT OF THE COMMISSIONER OF INTERNAL REVENUE. Fiscal Year Ended June 30, 1945. Available from Superintendent of Documents, Washington 25, D. C. Price, 40 cents.

ANTITRUST LAWS WITH AMENDMENTS 1890-1945. Compiled by Elmer A. Lewis, Document Room, House of Representatives. Available from Superintendent of Documents, Washington 25, D. C. Price 20 cents.

PAINT MANUAL WITH PARTICULAR REFERENCE TO FEDERAL SPECIFICATIONS. By Percy H. Walker and Eugene F. Hickson. National Bureau of Standards, Building Materials and Structures Report BMS105. Available from Superintendent of Documents, Washington 25, D. C. Cloth bound. Price, $1.00.

AIR TRANSPORT OF AGRICULTURAL PERISHABLES. Department of Agriculture, Miscellaneous Publication No. 585. Available from Superintendent of Documents, Washington 25, D. C., Price 10 cents.



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Letters to the Editor

Vacuum Not a Preservative

To the Editor
of FOOD INDUSTRIES:

I HAVE read with interest your recent editorial entitled, "Vacuum is Not a Food Preservative." We also sometimes receive inquiries on this subject.

The following statement appears on page 4, of Bulletin Number 8, by A. W. Bitting entitled, "Exhaust and Vacuum," published in 1916 by the Research Laboratories of the National Canners Association:

"Attempts were made, and strangely enough continue to be made, at preservation in vacuum alone, but without success, the failures being attributed to not being able to get all of the air out of the tissues of the product, and that heat was necessary for this purpose."

Apparently this statement is just as true in 1946 as it was in 1916.—*A. E. Stevenson, Research Dept., Continental Can Company, Inc.*

DDT and Fly Control

To the Editor
of FOOD INDUSTRIES:

In your issue of FOOD INDUSTRIES, June, 1946, page 96, in the article "Using DDT for Fly Control" we call your attention to the sketch recommending the spraying of DDT on walls and ceilings in the kitchen.

Evidently the authors' experience in using DDT does not cover its use around food plants. We have ourselves tried it. Any residual sprays should never be used on the ceilings in a kitchen or a food plant. The lasting effect of DDT results in flies and other insects continually dropping down from the ceilings into or on whatever is below. We think you can appreciate the fact that live flies are considerably less nuisance than dead flies dropping into receptacles, on tables, or in food. We experienced this difficulty last year in using residual sprays on the ceilings of our plant. The result was so bad that we cannot help calling your attention to the recommended procedure in your article. If you think it necessary we believe it would be well to issue a correction as well as call this matter to the attention of the authors.—*Stran Summers, pres., Charles G. Summers, Jr., Inc., New Freedom, Pa.*

The writer of the above letter brings out an important point in connection with the use of residual insecticide sprays. Directions for using DDT invariably emphasize precautions for the protection of exposed food or food in process. More specific suggestions or regulations apply in certain cases.

The authors of FOOD INDUSTRIES' June article, Leslie A. Sandholzer and J. M. Lemon, suggested covering food in the following paragraph:

"To protect the consumer from any possible effects of DDT, cover all exposed food, utensils, etc., before spraying."

The position of the Meat Inspection Division of the USDA is set forth in Memorandum No. 52, Supplement 1, issued May 9, 1946, which states:

"By contrast with this satisfactory use of DDT (around the outer premises and in inedible products departments) it has been found that its application to walls, ceilings and equipment in rooms where exposed meat or product is handled leaves a deposit of insecticide which cannot be readily removed and which continues to act rather slowly against flies that gain access to the room. The result is that many flies are overcome while operations are in progress and fall into the product. As the action of the insecticide is continuous, there is no practicable way in which the exposed product can be protected from contamination with the dead flies. With this experience it has become necessary to limit the use of DDT to places where exposed meat is not to be handled."

In the original Memorandum 52, issued November 9, 1944, MID recognized DDT along with certain other insect sprays but stipulated:

"These substances and such others as may be subsequently approved by the chief of division may be used as sprays for the elimination of roaches, flies, and other insects, *providing exposed meats are first removed and the premises cleaned by thorough washing after the completion of the operation.*"

The USDA issued a memorandum on March 27, 1946, with the title "Recommended Uses of DDT." These new recommendations on the use of the war-tested insecticide were drawn up for the 1946 crop year. Although not intended specifically for food processing, the recommendations include this caution:

"The main point to be considered is that DDT should not be applied in such a way that it will contaminate foodstuffs."

A statement on DDT was published by the Food and Drug Administration on September 5, 1945, which includes a section on the use of DDT in food processing plants. This agency has stated its present position as not opposed to the use of DDT for fly control or other insect control in food plants providing the use does not result in contamination of the food with DDT or by dead insects.

In conclusion, it should be pointed out that food processors using DDT should do so with care, good judgment, and strict observance of any specific industry or local requirements.—THE EDITORS.

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PATENTS

CEREALS

Dough Degassed And Twisted During Passage Through Vertical Chute Fitted With Plurality of Dough-Engaging Rollers—Grover N. Le Sage, Kansas City, Mo. No. 2,402,420. June 18, 1946.

Dried Split Peas Given Polished Surface by Mechanical Application of Finely Divided Talc and Water Coating—Leo L. Werts, Moscow, Idaho. No. 2,400,144. May 14, 1946.

Nut Butters Improved In Flavor By Incorporating Cholesterol-Betaine-Chloride in Mass of Ground Nuts—Joseph L. Rosefield, Laguna Beach, Calif., and Fitzhugh L. Avera, Oakland, Calif. No. 2,402,915. June 25, 1946.

DAIRY

Ice Cream and Similar Frozen Confections Made During Continuous Operation—Frank Thomas, Indianapolis, Ind. No. 2,402,931. June 25, 1946.

Skim Milk Treated With 1 Percent Water-Soluble Bivalent Metal Salt to Precipitate Casein-Metal Complex Capable of Being Dried to Form Water-Insoluble Film—Clarence D. Ender, Kalamazoo, Mich., to Hercules Powder Co., Wilmington, Del. No. 2,401,919. June 11, 1946

DEHYDRATION

Caramel Color Liquid Heated Under High Vacuum to Produce Dehydrated Expanded Cellular Product—Wilbert A. Heyman to Granular Foods, Inc. New York, N. Y. No. 2,402,999. July 2, 1946.

Beets, Peas, Pork, Soybeans, Navy Beans, Green Beans, Corn, and Carrots Dehydrated Under Vacuum—Robert M. Schaffner, Chicago, Ill., to The Guardite Corp. Nos. 2,402,672, 2,402,673, 2,402,674, 2,402,675, 2,402,676, 2,402,677, 2,402,678 and 2,402,679, respectively. June 25, 1946.

Food Materials Pre-cooked, Divided Into Particles of Uniform Size and Thickness, Soaked in Solution of Sodium Chloride and Sodium Carbonate Preparatory to Dehydration in Atmosphere of Heated Air Containing CO_2, CO, and SO_2—Frederick W. MacPherran, Milwaukee, Wis.; Charles C. MacPherran, deceased, to Nancy Ann Van Ells, Milwaukee, Wis. No. 2,401,493. June 4, 1946.

Rhubarb Cooked and Treated With Sodium Hydrogen Carbonate Preparatory to Spreading in Thin Layer and Drying—Huldah A. Shepard, Chicago, Ill. No. 2,400,845. May 21, 1946.

ENGINEERING

Fish Filleted by Mechanical Means—William H. Hunt, National City, Calif., to Atlantic Coast Fisheries Co., New York, N. Y. No. 2,400,118. May 14, 1946.

Fruit Stemmed by Mechanical Means and As Individual Units—Burton C. Coons, to Food Machinery Corp., San Jose, Calif. No. 2,401,463. June 4, 1946.

Powdered Sugar Made Resistant to Caking When Damp by Mechanical Treatment to Convert Powder Into Small Pellets—Harold R. Dalton, Teaneck, N. J. No. 2,400,292. May 14, 1946.

Predetermined Number of Fruit Pieces Mechanically Separated From Promiscuous Mass and Transferred to Point of Use or for Further Treatment—Burton C. Coons, to Food Machinery Corp., San Jose, Calif. No. 2,398,922. April 23, 1946.

Raw Sugar Juices Purified in Continuous Manner by Hydrogen-Anion Exchange System of Treatment—Hilding B. Gustafson, Hinsdale, Ill., to Infilco, Inc., Chicago, Ill. No. 2,403,177. July 2, 1946.

FATS AND OILS

Margarine Improved By Incorporation of Lecithin—Joseph Stanley, Chicago, Ill., to American Lecithin Co., Cleveland, Ohio. No. 2,402,690. June 25, 1946.

Solubility of Vegetable Phosphatide in Glyceride Oil Increased by Addition of Small Quantity of Oil-Dispersible Acid-Liberating Agent—Percy L. Julian, Maywood, Ill., and Edwin W. Meyer, Evanston, Ill., to American Lecithin Co., Cleveland, Ohio. No. 2,400,120. May 14, 1946.

MISCELLANEOUS

Foods Frozen During Passage Through Two Substantially Closed Chambers on Conveyors in Contact With Circulating and Refrigerating Air—Norman Sharpe, San Luis Obispo, Calif. No. 2,402,921. June 25, 1946.

Casein Dissolved in Dilute Alkali Spun Into Bath of Water Solution of Lactic Acid, Lactate and Inorganic Salt With pH Higher Than 2 to Obtain Protein Product With Low Shrinkage Characteristics—George Stephan de Kadt, Leeuwarden, Netherlands, to Alien Property Custodian. No. 2,398,625. April 16, 1946.

Cheese and Similar Foods Packaged In Moisture-Proof Wrapper Composed Principally of Nitrocellulose, Polyvinyl Butyral Resin and Plasticizer—Tracy Cowen, Malverne, N. Y., to Standard Cap and Seal Corp. No. 2,402,605. June 25, 1946.

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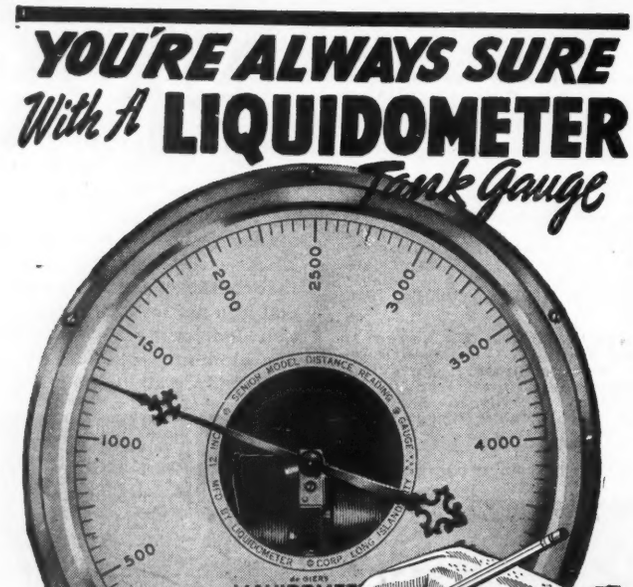

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Folic Acid

(*Continued from page* 92)

work hitherto unpublished, which has been conducted in Puerto Rico.

Of vital interest to food processors is the question of the stability of the new vitamin. In pure form, folic acid is reported to be reasonably heat stable. Heat processed foods are usually low in folic acid, however. Research appears to be indicated for the purpose of fixing the conditions under which the folic acid content of foods may be preserved, just as was done in the case of thiamine or ascorbic acid.

Minor points not yet cleared up in the physiological action of folic acid include the place of supposed "conjugating" compounds. The folic acid in natural liver preparations appears to be linked up in some manner since it is difficult to demonstrate the folic acid in some of these preparations. The unlinked folic acid, as made synthetically, is, however, fully effective. It has also been stated that some people suffer from folic acid deficiency because they are unable to break up one of these conjugated compounds. Conversely, it has been suggested that the folic acid may have to combine with something else before the body can utilize it, but this hypothesis has not been generally accepted.

It is interesting to know that pediatricians were prescribing B-vitamin foods for children sick with a disease resembling sprue, long before the folic acid picture had been clarified. The physicians realized that some agent was present in the protective foods, other than the vitamins then known, and that these foods would help to relieve the anemia and diarrhea. Bananas were often recommended on this basis. Apple pulp also contains the folic factor, although the concentration is low.

Analytical Methods Important

As to how soon food technologists will have to take cognizance of the folic acid factor, nutritionists are inclined to agree with Dr. King, who believes that a first concern is to introduce qualitative and quantitative analytical procedures for folic acid and other new accessory factors. Enrichment of processed food will apparently be limited in application for the time being, owing to the ease with which folic acid is destroyed. Dr. King foresees renewed emphasis on foods that are fresh, or prepared and distributed with great care. Fresh fruit and fresh meat will regain their dignity, he believes. Just

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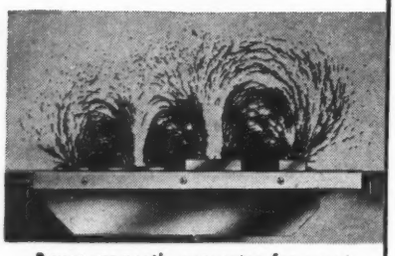

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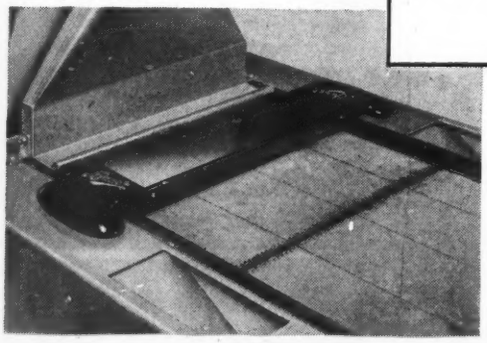

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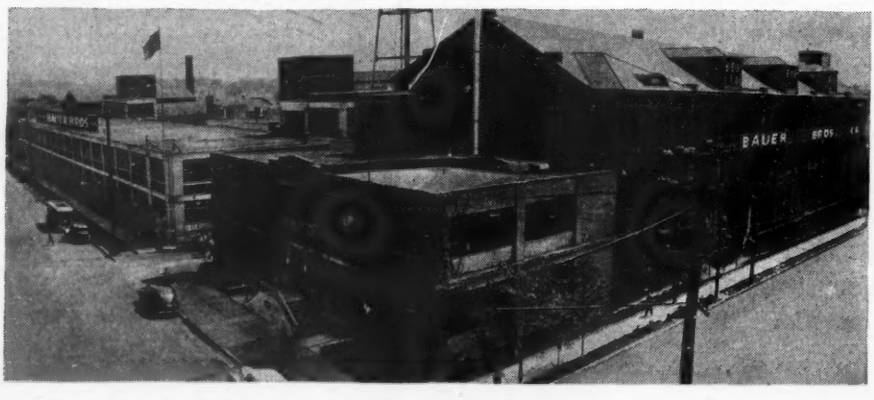

as thiamine, however, is playing an important part in the cereal field, while ascorbic acid has been prominent in the case of fruits and vegetables, so can important roles be expected for the newest accessory factors. Dr. King predicts, "within the very near future, a series of rapid developments relative to folic acid and other new, unstable members of the vitamin B complex."

—End—

Curing of Cheese

(*Continued from page* 83)

the curing process and by wiping the rinds of the cheese at each turn with a solution effective to retard the development of cheese 'mites' and to ensure that the rind will carry in sound condition without the development of soft tops or rind rot. While it is possible that various brine solutions and gasses may be subsequently developed for this purpose, I have found that the best results are obtained by wiping the rinds of the cheese with a saturated solution of disodium phosphate.

"In carrying out this invention, the cheese, after being unboxed, is placed on shelves, in a suitable room or chamber in which the temperature and humidity of the atmosphere is properly co-ordinated with reference to the original moisture content of the cheese to be cured. At regular intervals the cheese is turned end for end and the rind wiped off at each turning with a saturated solution of disodium phosphate. It is preferred that the cheese be turned over every two or three days, but it is quite possible that some variation from this procedure may be resorted to with satisfactory results. Under these conditions, it is possible in curing cheese having an original moisture content ranging from 32 to 35 percent or thereabouts to maintain the atmosphere in the curing chamber at a relatively high temperature ranging between the limits of 55 to 65 deg. F. For curing cheese having a moisture content within the limits specified, this range of temperatures with a relative humidity of 96 to 97 percent creates a condition such that the desired chemical and bacteriological changes take place under optimum favorable conditions with the result that the cheese ripens more quickly and is found to have a quality and flavour superior to that obtained with any of the ripening or curing processes now in use."

Waters recognizes in this patent a problem of high temperature curing

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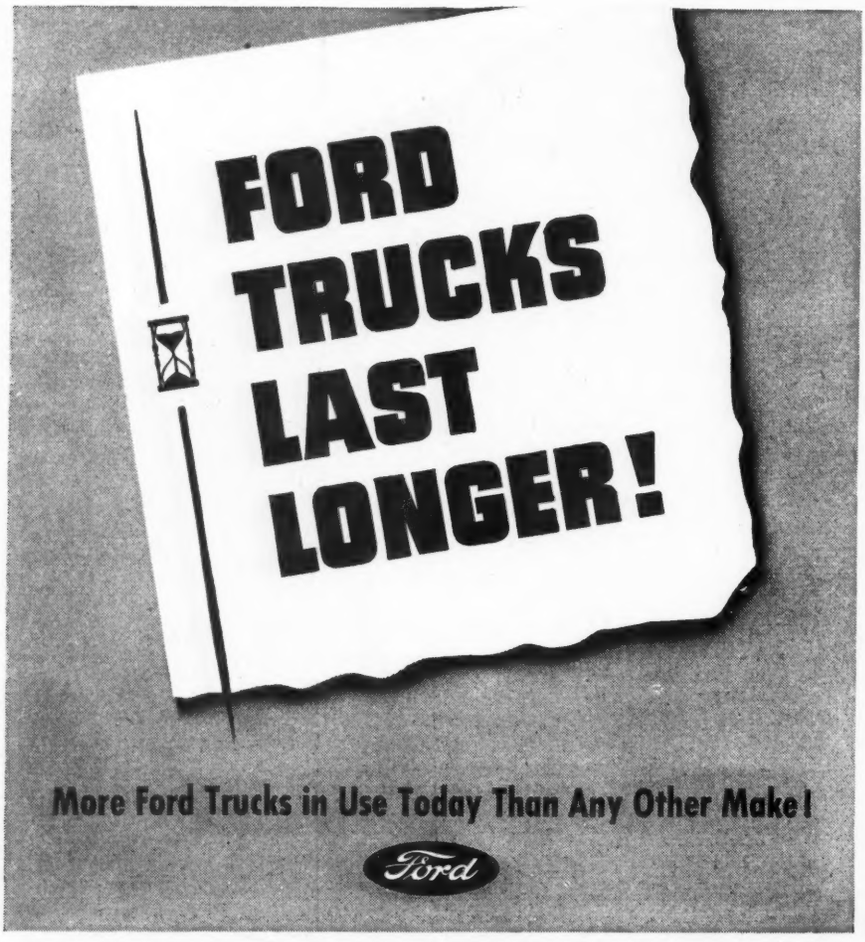

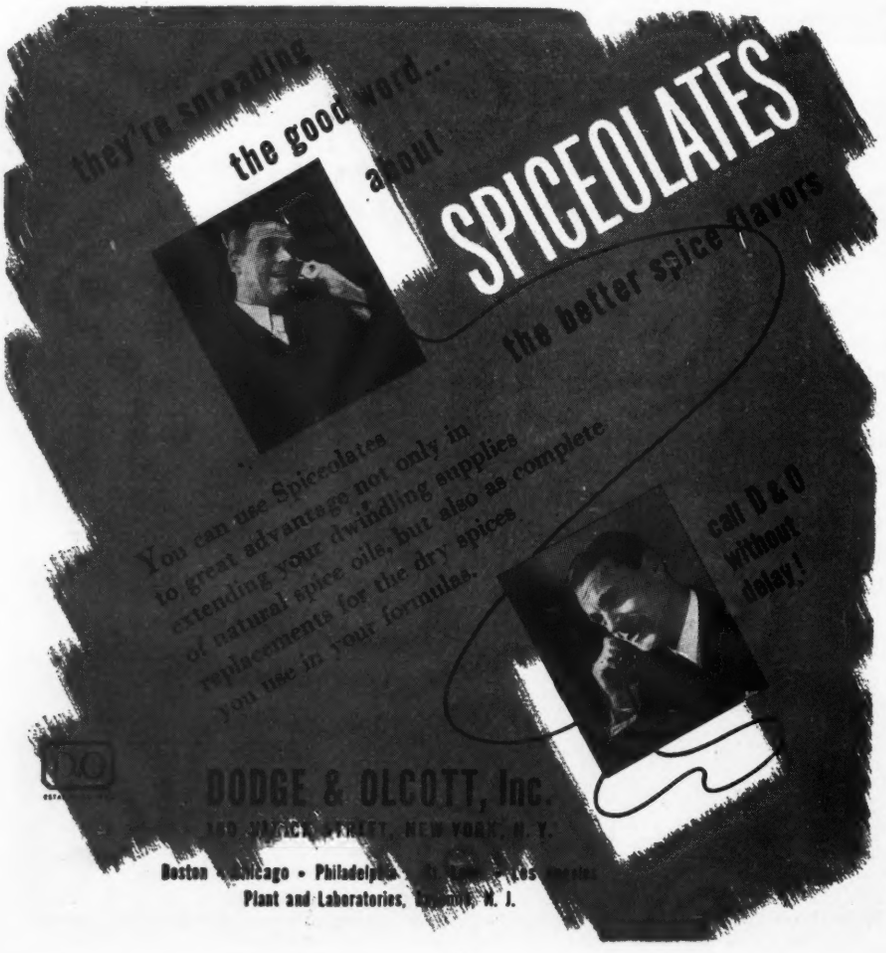
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known to all who have tried it on any large scale—that of losses due to insect infestations. He states he has solved this by the use of disodium phosphate, but you will observe that frequent regular treatment of the cheese is necessary.

Goss and Hammer Method

Goss and Hammer,[8] of Iowa State, recognizing the losses from shrinkage, rind rot, insect damage and rind formation in curing Cheddar cheese developed a method for curing in oil and secured a patent on it in 1934. They believed their method to be most useful for small styles and showed the following results:

Lot	Treatment	Percent loss after two months
85	Paraffin	2.5
	Oil	0.0
89	Paraffin	1.83
	Oil	0.0
91	Paraffin	2.4
	Oil	0.3

Lakeshire-Marty tested their method on large styles of cheese at 60 and 70 deg. F. A satisfactory product was obtained but the process was not continued because a slimy mycelium growth developed in the oil which could not be readily removed although several different filters were tried.

Previous to the war, when highly flavored cheese demanded a premium over the mild type the practice of curing a limited amount of Cheddar cheese at 60 deg. F. was rather common with the large assemblers of cheese. There was a definite demand for the type of flavor produced and large rooms with suitable humidity controls were maintained to cure such cheese. This was known to the trade as "shelf-cured cheese." The cheese to be cured was carefully selected for quality and one specification of interest to current readers was that the cheese be made from unpasteurized milk. The purpose for this was to obtain as high a flavor as possible as well as a typical flavor to satisfy the market demand. Many trials have been made with pasteurized milk cheese, but unpasteurized milk cheese is preferred based entirely upon its superior flavor development. To say that pasteurized milk cheese can substitute for this product is an error made by those lacking in knowledge of consumer preference.

Problems Involved

If all milk for Cheddar cheese is to be pasteurized, due to requirements set by federal or state legislation, then higher temperature curing may be practiced with unselected cheese with greater certainty than

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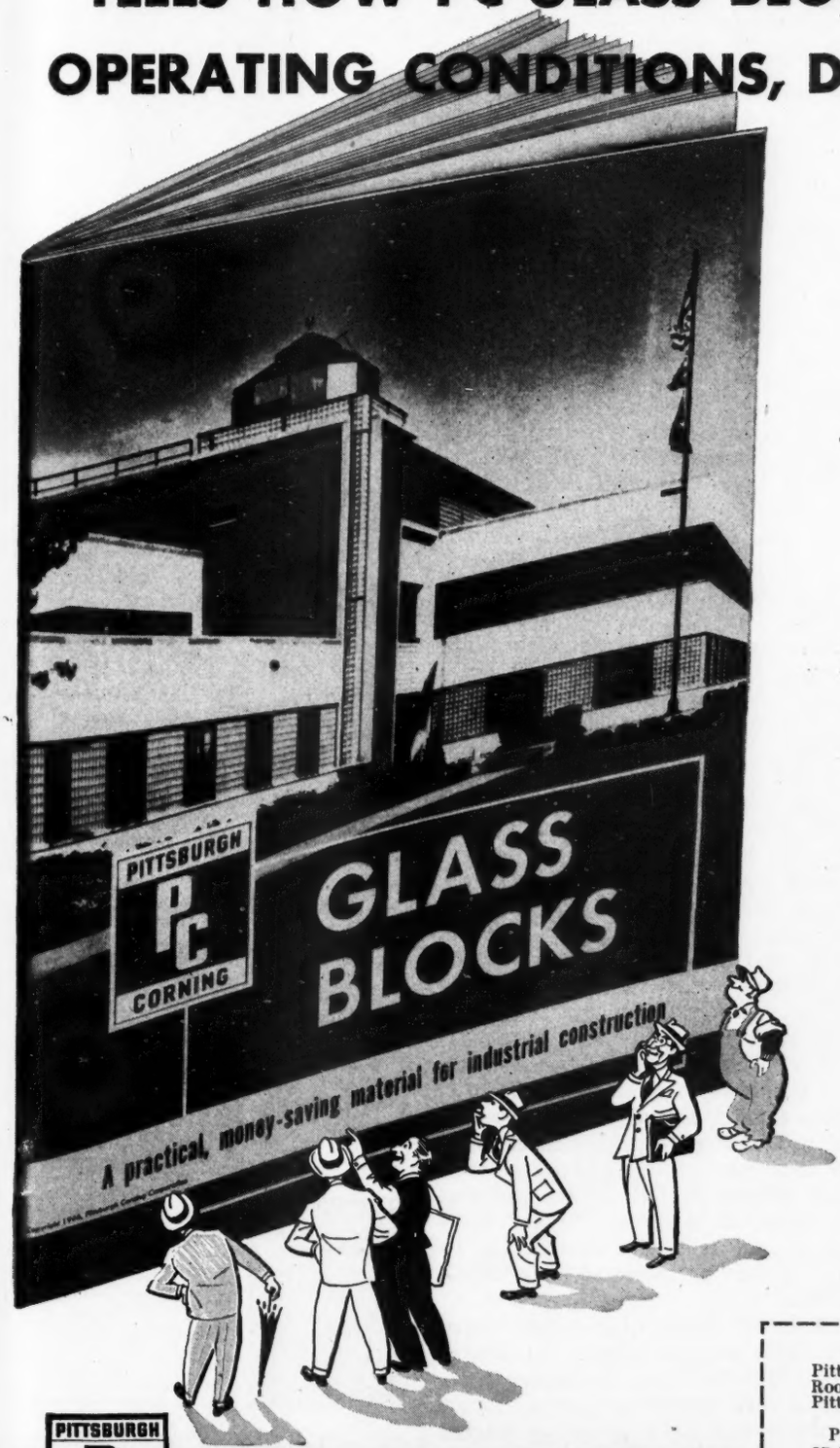

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is possible with unselected raw milk cheese. The humidity in the storage rooms, however, will have to be more carefully controlled than at the present time. If the temperature is increased above 40 deg. F. control of insect development must be checked closely. Mites do not increase in numbers at the lower temperatures but become increasingly active as the temperature increases. They can be more successfully controlled today than ever before due to the development of methyl bromide as an agent for fumigation, but it should be emphasized that extra watchfulness and expense are required as compared with low temperature curing.

As the humidity is increased, and this is necessary to keep down shrinkage losses, the rind defects will be more common. At humidities above 70 percent it is no longer possible to cure the cheese in boxes. To avoid rind defects they must be placed on shelves and each cheese turned at regular intervals. This extra labor and expanded storage space add to the expense of curing.

Summary

Low temperature curing (below 40 deg. F.) affords the following advantages as compared with high temperature curing (60 deg. F.): (1) No loss from insect infestation; (2) a minimum loss from shrinkage; (3) special humidity control in commercial storage is seldom necessary —occasional circulation of the air is sufficient; (4) the maximum use of storage space is obtained and (5) cheese can be held for one to two years without handling, with a minimum of selection of original stock and with a minimum of deterioration in grade.

The advantages of high temperature curing are: (1) A cheese with a special type of sharp cheese flavor can be produced, which appeals to a limited market and (2) this special sharp flavor can be obtained in three to four months with unpasteurized milk cheese. A high flavor may also be obtained with pasteurized milk cheese but it is not comparable to the flavor of selected raw milk cheese.

A profit from high temperature curing is possible when: (1) Losses are prevented from shrinkage; (2) losses are prevented from insect damage, and (3) a premium market exists to pay for the extra expense involved.

This discussion should serve as a word of caution to the uninitiated who may be considering high temperature curing of Cheddar cheese. It is not an easy road to riches;

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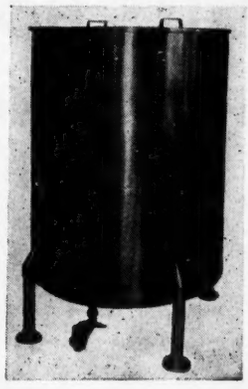

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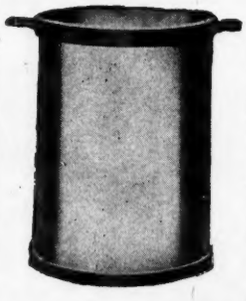

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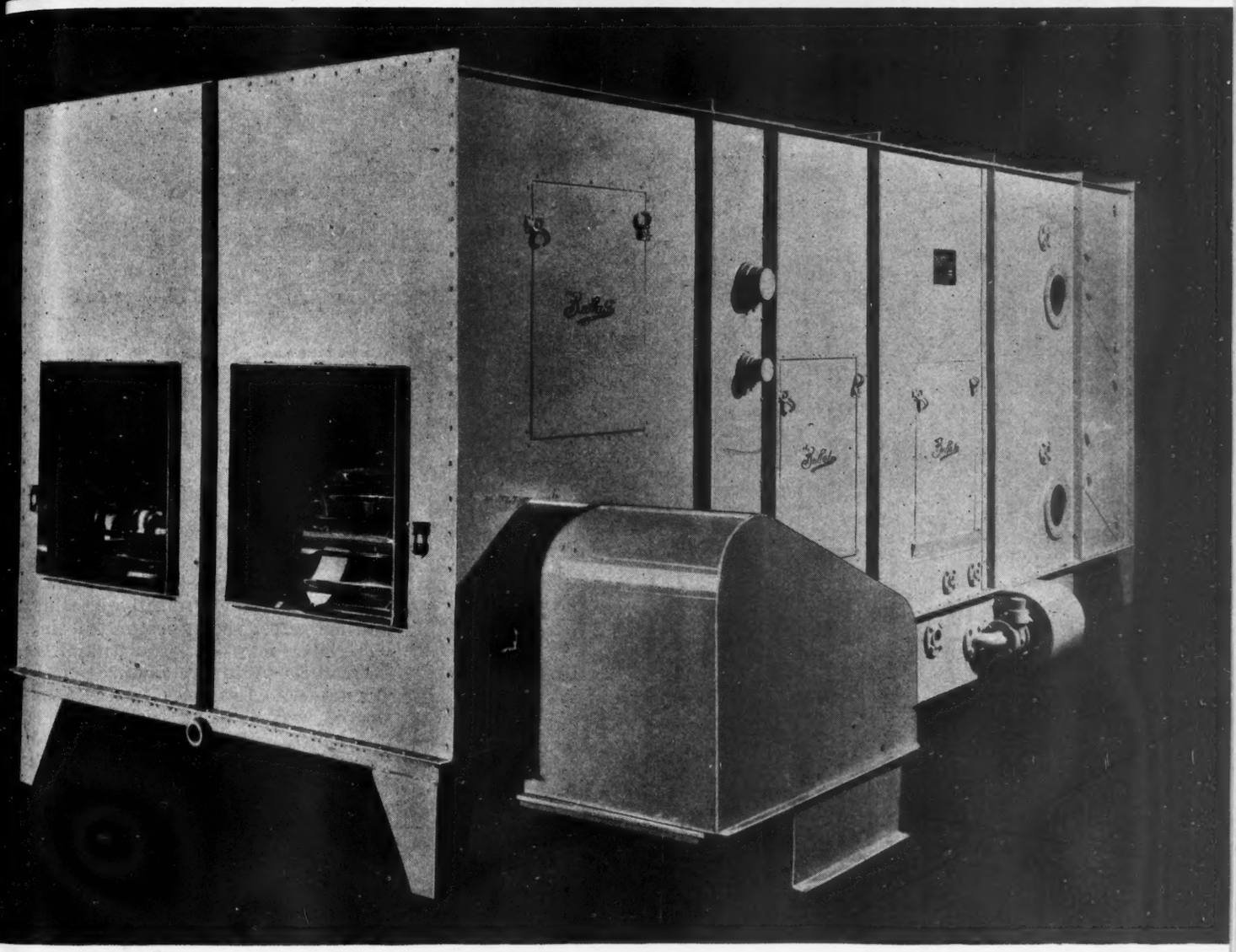

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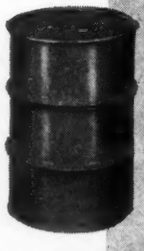

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neither is it the answer to the cheese industry's problem of improving the flavor of the pasteurized milk cheese. What we need, and we must have it soon if government regulations follow the course they have taken, is an exact knowledge of the source of flavor development in out best raw milk Cheddar cheese. We hope that this will result in a means for producing the finest cheese flavor in pasteurized milk cheese.

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—End—

Frozen Foods

(*Continued from page* 101)

brand-label stock carton items; colors may be employed; and containers may be printed. Protective coatings do not affect the colors or printing. The labels may be used as part of the structural protective features of the containers. Examples include laminated waxed paper, cellophane or glassines. Moreover, this type of container stacks easily for sales display purposes.

Still the quest goes on for better frozen food packaging. Today's "best" is frequently tomorrow's "obsolete" in this field of packaging. The can companies, fully realizing the inadequacy of tin cans for frozen food packaging, have developed rectangular, fibreboard containers with mechanically sealable metal ends, which overcome most of the packaging problems. Paper or other flexible materials possess innate properties, which now seem to give them certain preferences. But don't overlook the superior sales appeal and speedier freezing of the aluminum foil wrapper and heavier gage foil carton. In fact, new developments in foils promise to receive much widespread acceptance.

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Will we see the return of materials unavailable during the war, such as the complete thermoplastic coating for cartons? These coatings possess all the protective functional properties required of an ideal pack-

Bemis "Three Way Service" Gives You

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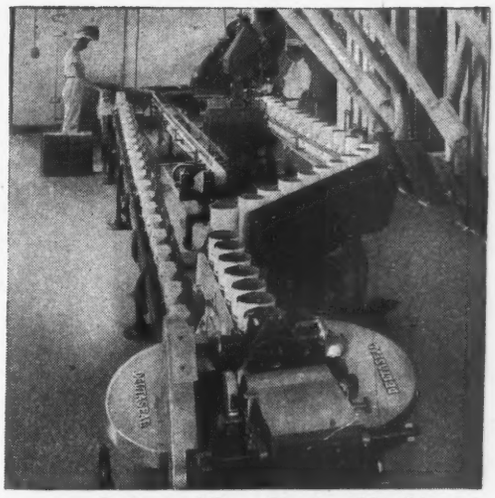
With the Bemis Deltaseal System of Packaging you get *every element* of a complete three-way packaging service from *one* company.

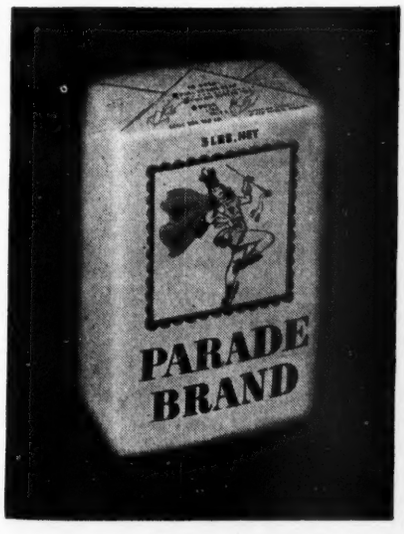
For manufacturers whose products are sold in powdered or granular form, it has already proved the way to increased sales and lower packaging costs.

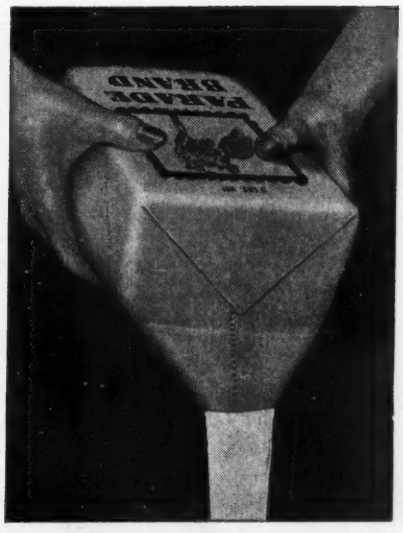
Look at these three basic packaging functions which make it easier for you to handle and sell your product.



1. **Deltaseal Bag Closing Machinery**—Designed by Bemis packaging specialists.

2. **Service**—Bemis specialists assist you by making timely suggestions for new efficiency on your packaging lines.





3. **Bags**—The Bemis Deltaseal Bag, colorfully printed with your brand, gives you the Deltaseal feature, the "easy pour" spout that has won enthusiastic consumer acceptance and is equally popular with your trade.

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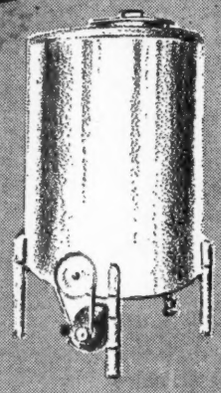

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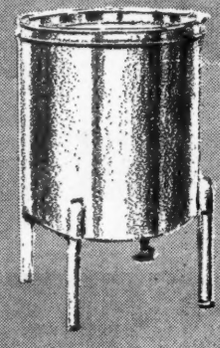
Tanks are all welded construction finished with No. 4 polish on inside and bright finish outside. All inside welds are ground smooth and polished. The Stainless Steel construction throughout assures you of a rust-proof, acid-resistant, easy-to-clean tank that will speed up and increase the efficiency of your processing or storage operations.



MANY MONEY-SAVING FEATURES—

San-I-Tanks have special self-draining features with specially formed bottoms sloping to the front. Engineered to give maximum performance and many years of extra use—meaning savings for you—all at no higher cost. Designed primarily to meet EVERY storage or processing need—you will find the San-I-Tank complete in every detail.

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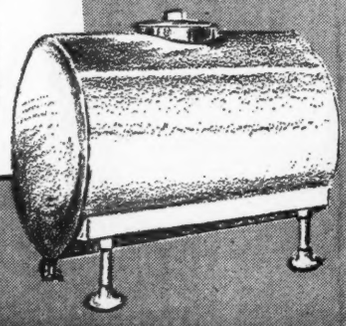
For your convenience we have available a complete engineering service to design and recommend the best tank for use where a standard San-I-Tank will not meet your requirements. If you have a special tank problem send us the data, and let our staff solve it for you.



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age for frozen foods. Notably among these thermoplastic coatings is the significant latex "form-fit" wrap for packaging frozen poultry, various roasts and seafoods. Poultry, packaged in this latex wrap, has been maintained in an excellent state of preservation for five years without the slightest trace of dessication or surface discoloration.

The opportunity for frozen food package pioneering is further enlarged by the characteristics of the products themselves. There is danger of quicker rancidification with fish, meat or fowl of high fat contents. Since oxygen produces rancidity by oxidizing the fats and oils, it must be kept out and moisture must be retained. The opposite is true in the packaging of cereals or dehydrated products where moisture must not be allowed to penetrate into the package.

Net Weight

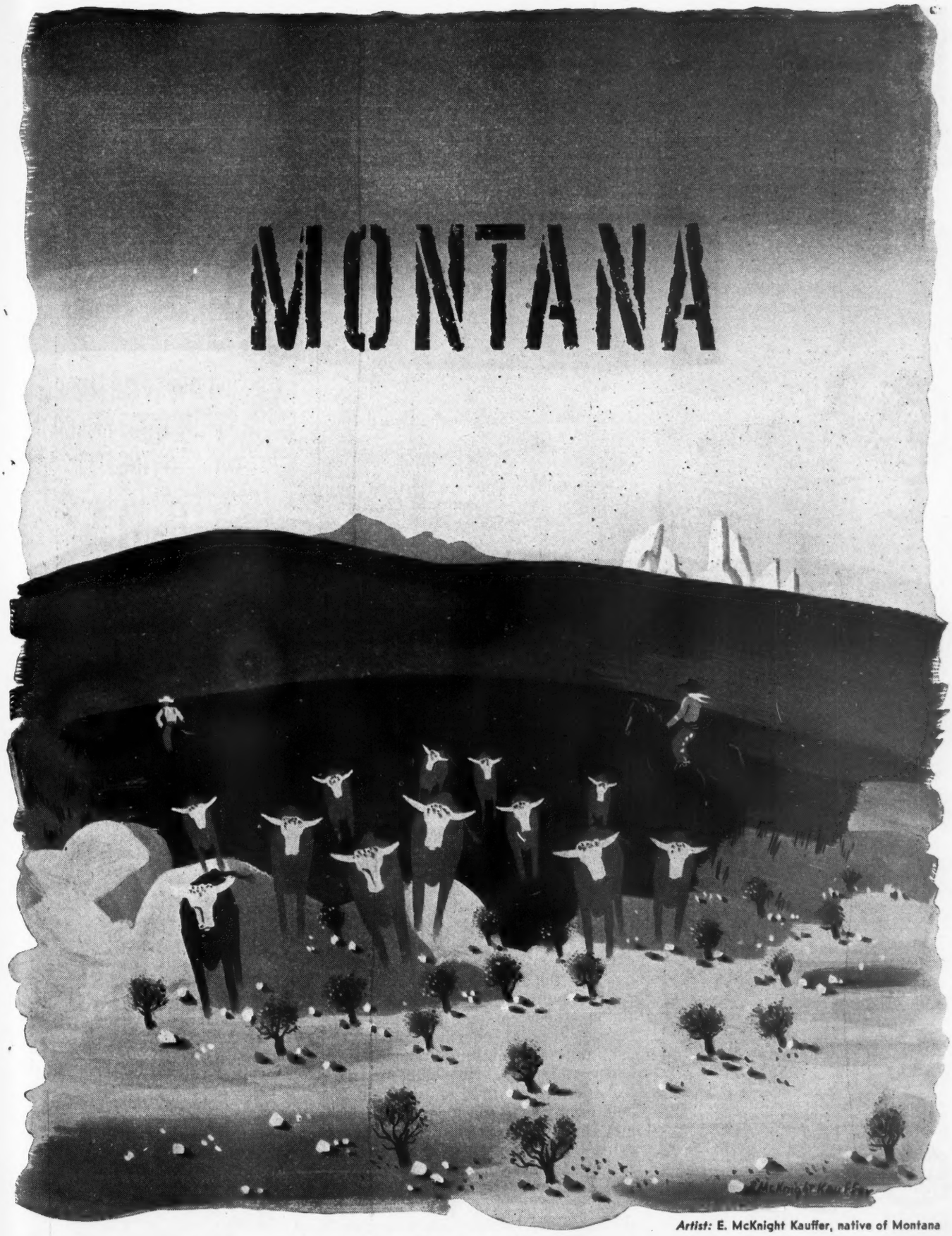
The problem of weight losses through dehydration must not be overlooked. Sometimes these losses are slight. On other occasions they may be significant, depending upon the nature of the packaging material. Weight losses invite serious complications with the consumer and/or the government. The latter requires that a pound be a pound and not an approximation. The net weight is that of the contents and not the contents minus a certain amount of moisture, which has passed through the container during freezing or in sub-zero storage.

The only test of how well the package meets the requirements for protection is the condition of the product *when the consumer prepares to serve it.* No intermediary tests are conclusive. Control of the quality established can go beyond the plant only if the package is satisfactory and prevents deterioration.

Standard for Packaging

Where do we go from here? Food technologists are specialists in quality control. They know what is indicated, but all of that is of little avail unless something realistic is done to add it up in terms of a constructive program.

Specifically, food technologists should prepare standards for the packaging industries, as is now done for the food processors. With these rigid specifications, control of product quality will extend beyond the plant. These measures will guarantee the future acceptance of frozen foods. And, from a quality control aspect, the future of the industry will be assured and not in jeopardy.



Artist: E. McKnight Kauffer, native of Montana

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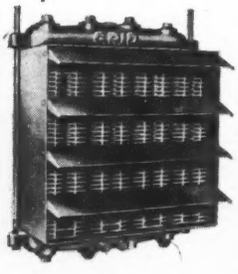

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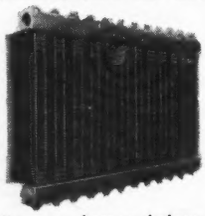
★ • One piece construction heating sections (patented) of high test cast iron that withstand steam pressures up to 250 lbs.

★ • No soldered, brazed, welded or expanded connections to become loose or develop leaks.

★ • No electrolysis to cause corrosion, breakdowns, leaks, or heating failures.

It's the material that makes the difference. GRID High Test Cast Iron Unit Heaters are built to last for years. In many food processing plants they have been operating continuously for 16 years without maintenance expense.



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The same one piece construction heating sections (patented) of high test cast iron, as GRID Unit Heaters, GRID Blast Sections withstand steam pressures up to 250 lbs. . . . have no tortuous air passages . . . complete absence of ruptures, strains and warping . . . compact, they occupy minimum space . . . no soldered, brazed, welded nor expanded connections . . . no electrolysis to cause corrosion . . . many successful installations in food processing plants.

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Acknowledgments

This article is based on a symposium prepared by The Packaging Institute for the 1946 annual meeting of the Institute of Food Technologists, Buffalo, N. Y. Helpful collaboration of the following members of The Packaging Institute is acknowledged:

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C. Rondomanski, Sealright Co., Inc.

—End—

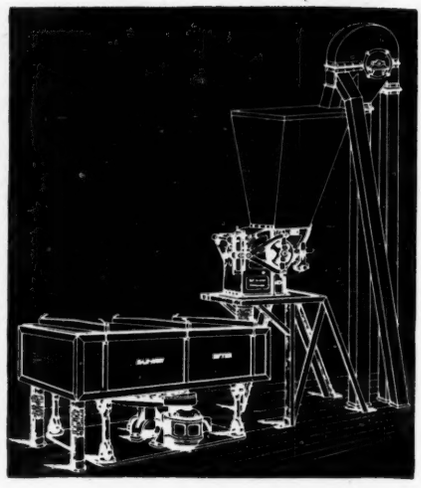
Standards

(*Continued from page* 86)

ponents of standardization deny that progress will be impeded. But many manufacturers, research men and executives who approve research budgets agree that the imposition of standards, which define the exact ingredients of a product, will discourage the incentive to improvements and will tend to minimize competition. To better explain this point of view the proposed corn standards may again serve as an example.

Trend of Nutritional Research

Under these, corn products are defined as to granulation. A definite percentage must pass a screen of specified size, another percentage must remain on a second screen and not less than a specified percentage must remain on a third screen. The fat and fiber contents are specified. In the case of enriched products, maximum and minimum amounts of added thiamine, riboflavin, niacin and iron are required and vitamin D and calcium in specified quantities may be added optionally. Nothing more and nothing less may be included. It is important to remember that these are not merely minimum requirements. There is a ceiling on the nutritional value. Recently Professor Elvehjem of the University of Wisconsin has shown that some of the trouble with corn is its low content of tryptophane.[2] He has also shown that the growth promoting effect of corn diets is affected by the



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THE diagram suggests an efficient method of supplying material to a BAR-NUN Rotary Sifter for scalping, sifting, rebolting or grading. A DRAVER wing type Feeder supplies measured capacity to the Sifter. The IDEAL Ball Bearing Elevator may be fitted with overflow discharge to assure ample supply of material with no danger of choke-up. Gump engineers will gladly recommend the installation best suited to your needs. Write for complete information.

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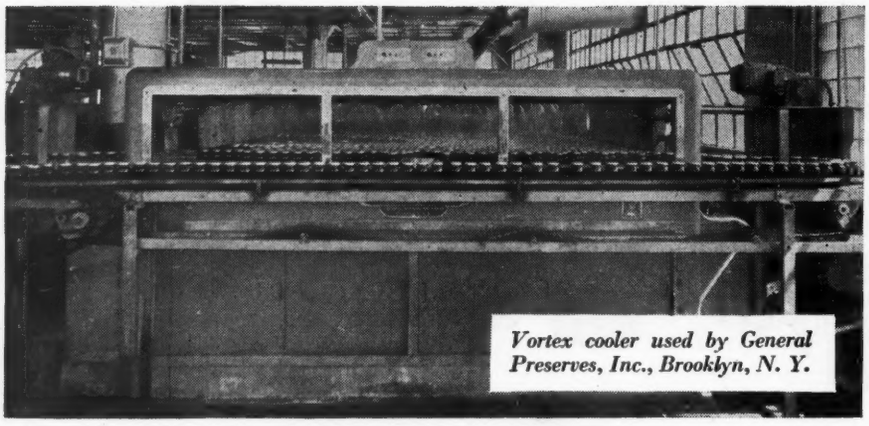
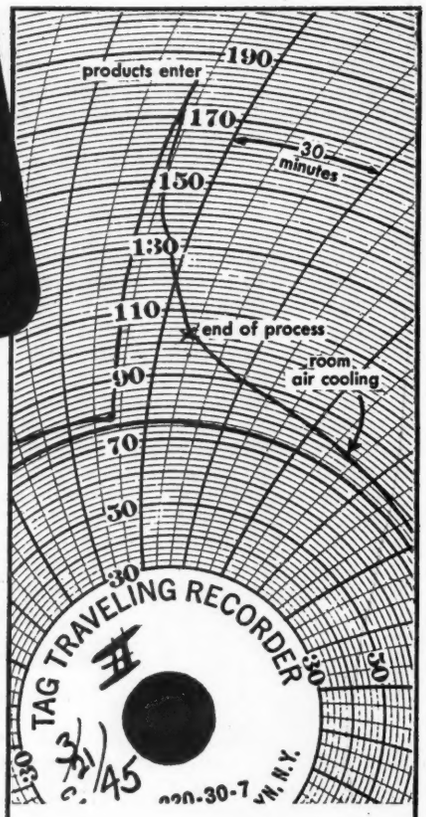


Vortex cooler used by General Preserves, Inc., Brooklyn, N. Y.

Your Hot Packaged Foods Deserve

VORTEX Automatic Cooling



The process recorded above is cooling 1 lb. hot marmalade jars 80° F. within 20 minutes to packing temperature.

Automatic cooling of your products deserves scientific treatment to preserve the original flavors and clarity by *positive* control of time and temperature.

The Vortex system is entirely automatic in operation and can be run continuously without operators, requiring only routine maintenance. The heat exchange medium is atomized water, distributed over the containers in such a manner that maximum cooling is achieved with a minimum quantity of water.

Vortex coolers are widely adaptable to individual requirements and have an almost limitless capacity range for all sizes of jars, bottles or cans. The use of these machines greatly conserves floor space and allows for immediate labeling and packing. A rapid drying system can be supplied with the discharge conveyors, if desired.

Whatever your problem of cooling—or heating—your products, it will pay you to learn the Vortex method of achieving uniform results economically. Send us your process requirements and write for bulletin No. 87 today.

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type of carbohydrate present. The whole trend of nutritional research is in the direction of emphasizing the inter-relationships existing between the many individual nutrients. Fats, carbohydrates, amino acids, enzymes and vitamins can no longer be considered as individual entities, each with its own peculiar function, but rather they are members of the great family of nutrients each acting as an individual but also each having an influence on the action of many of the other members of the family.

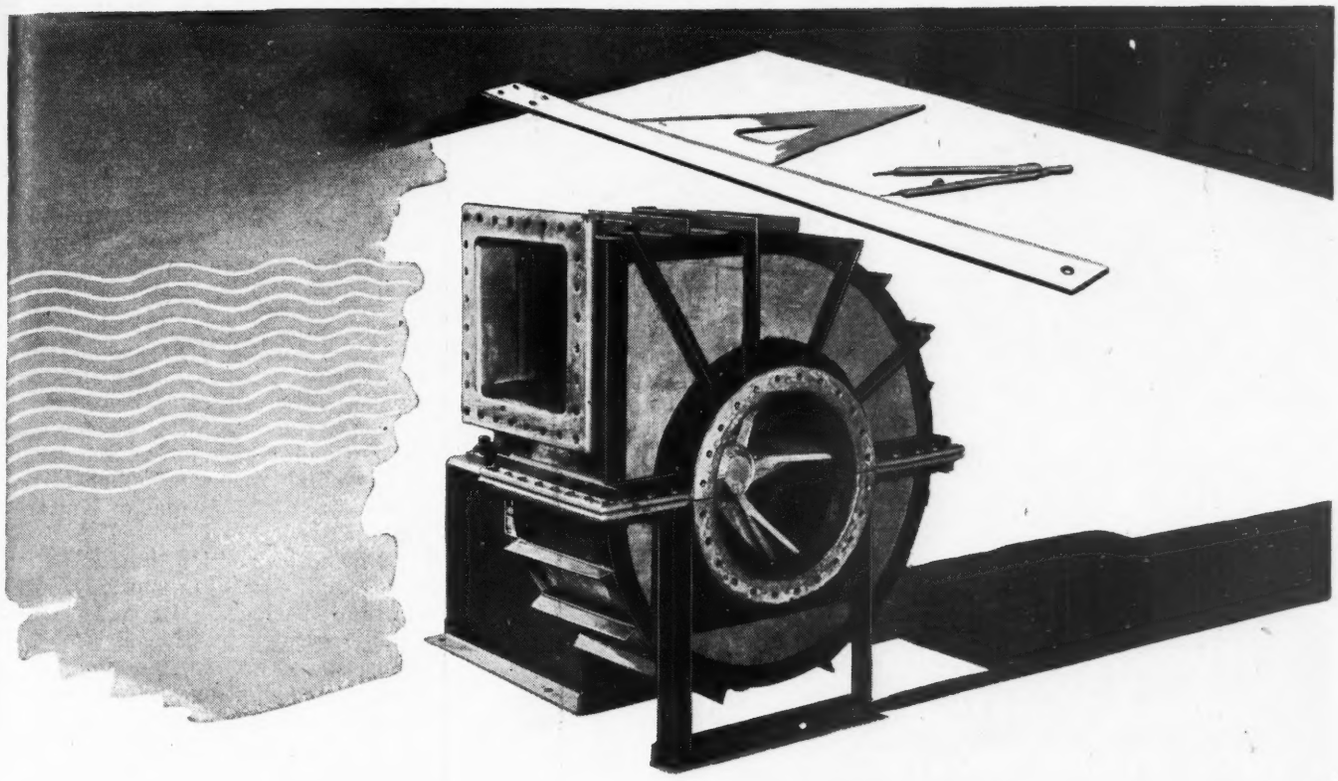
This work of Elvehjem opens the way for the production of corn products of greater nutritional value than have ever been produced. It will require time, money, and research effort to make these developments. No one can deny that corn meal might be improved by the addition of a few percent of dried milk, a little soya flour, possibly some yeast, or oat flour or tryptophane. But with standards, nothing of the kind can be done without first getting permission from Washington. But where is the research man who wants to attend a public hearing and obtain government sanction each time he makes an improvement? Where is the industrialist who wants to sponsor research if its results cannot be used without going to Washington?

Problem of Dusty Farina

Another very simple case may be cited. A manufacturer of enriched farina was adding calcium carbonate and as a result the product was dusty. It was found that this difficulty could be overcome by adding a fraction of 1 percent of vegetable oil. The oiled product was more satisfactory, it was just as nutritious, but no oil could be added because oil is not included in the definition of enriched farina. The manufacturer's only alternatives were to petition for a public hearing to change standards or to continue making a dusty product.

Must Oppose Restrictions

Food manufacturers are selling nutrition. Their millions of dollars spent in advertising have been a most potent factor in the education of the American public along nutritional lines. National advertising reaches its millions while government bulletins reach their hundreds. Just as industry spent millions in putting across the various War Bond drives, it spent an untold amount in publicizing the Basic-7 in the food field. The food industry originated and pioneered enriched foods long



Traffic cop for "ill winds"

Hot sulphuric acid fumes are "ill winds," hard to handle in your plant. But this lead-coated and lead-lined American Blower Corrosion Resisting Fan does the trick.

To collect or remove other corrosive gases, vapors, fumes and smoke, there are various other types of coated, covered, lined and alloy metal fans built by American Blower. They are serving efficiently today in a wide range of industries and processes.

Just put your problem up to the nearest American Blower branch office. It represents headquarters for corrosion-resisting fans, air handling and conditioning equipment of every type, Dust Collectors and for the famous Gyrol Fluid Drives for the smooth transmission of power and stepless variable speed control. Phone or write today—ask for Descriptive Bulletin 1241.

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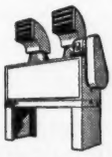
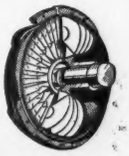
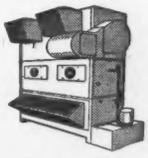

Heating Equipment

Ventilating Equipment


Gyrol Fluid Drive

Industrial Fans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before there were any federal standards. Oatmeal, farina, whole wheat biscuits, wheat, corn, rice flakes, and other cereals were being enriched years ago. Experimental sales of enriched corn products were in progress before the first compulsory corn enrichment law was passed. Federal standards create nothing new, they offer no incentive to creation but rather discourage creation. They freeze industry at the point it has reached by voluntary initiative. The food industry, advertising agencies, newspapers, magazines and all the public interested in consumer education should unite to oppose the imposition of restrictive standards.

The final report of The Mixed Committee of the League of Nations[3] stated:

"Preventive action against such nutritional diseases as scurvy, rickets and beriberi, although superficially more impressive, is probably of less importance to the human race than the acquisition and application of such knowledge as will also improve the general condition and well being of every man, woman and child, through the better choice, provision and utilization of foodstuffs."

Dr. Karl T. Compton, chairman of the board of trustees of The Nutrition Foundation, said that the leaders of the food industry "are striving to advance the science of nutrition for the purposes of strengthening the war effort today and building better living for tomorrow."[4]

The restrictive type of federal standards such as is proposed for the corn industry will largely remove the stimulus "for the acquisition and application" of the kind of knowledge referred to in the League of Nations report and will handicap the advance toward "better living for tomorrow."

Industry Supports Research

It may be argued that much nutrition research is done outside of industry and this will not be affected by the promulgation of standards. It is true that the biggest names in nutrition are generally engaged in academic work but how much of that work is being supported by private industry? Dr. C. G. King of the Nutrition Foundation recently announced that well over $1,000,000 had been allocated to fundamental research by that foundation during the past five years. All that money came from private industry interested in progress, not maintenance of the present level. Check with any of the large universities doing outstanding work in nutrition and see if a substantial part of that

THE combined research, production and distributing facilities of three famous companies are now offered to American industry by The Colorado Fuel and Iron Corporation. Thus, a new nation-wide service is made available in steel, wire products, and allied specialties under the trade-marks of Wickwire Spencer, Calwico, and CF&I—each a standard of industrial progress in its own right.

The East and Middle West will continue to be served by Wickwire Spencer Steel Division. The Colorado Fuel and Iron Corporation will serve the Plains and Mountain States with CF&I facilities as before plus the products of the eastern and western divisions. The California Wire Cloth Corporation (a subsidiary) will supply its own products and in addition the products of the other two divisions to Pacific Coast customers.

The well-earned reputation for quality which these three companies have enjoyed will be maintained in the new and greater Colorado Fuel and Iron Corporation.

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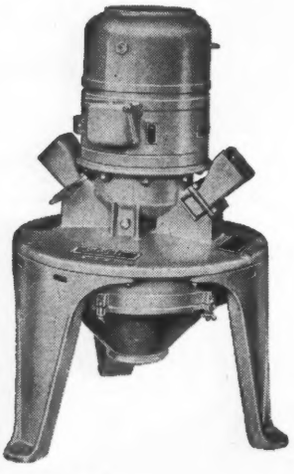
Operating records prove that "ENTOLETER" Continuous Control destroys all forms of insect life. In addition to this service, mills and food plants are reaping other benefits from the "ENTOLETER" system. Here are three positive advantages.



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Now, more than ever, your plant and products need the "ENTOLETER" system of continuous insect control. It helps you to avoid waste of scarce food materials . . . to protect 80% flour . . . to insure the high standards of your products.

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Food plants and flour mills have found that the "ENTOLETER" system offers an excellent means of blending flours, mixing ingredients in compounds and improving vitamin distribution. This, alone, more than justifies its cost.

For full information on "ENTOLETER" Continuous Insect Control System, write to ENTOLETER DIVISION, The Safety Car Heating and Lighting Co., Inc., P. O. Box 904, New Haven 4, Connecticut.

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work is, or has been supported by private industry. This money has been spent for the purpose of creating new markets or larger markets or by one group to gain a competitive advantage over another. When oatmeal was discovered to be rich in thiamine, $1,000,000 was spent in educating the public to the value, first of thiamine and then of oatmeal. This experience has been repeated over and over. That campaign had a good deal to do with causing manufacturers of other cereals to add vitamins to their products. The readiness of large cereal manufacturers to adopt new ideas and new products is one of the major reasons synthetic vitamins are so readily available today. One cereal company started enrichment of puffed wheat with thiamine when that vitamin cost $1.65 per gram. It is now 16 cents per gram. Credit for this great reduction in price is also shared by the owners of the thiamine patents and the chemical companies making the product, but unless the food industry had voluntarily created and adopted the idea of enrichment the price would not be this low.

It is argued that manufacturers have sometimes made improper claims in regard to nutritional values and that in the public interest the government must define exactly what may not be put into a food. Certainly mistakes have been made but the only one who never makes a mistake is the one who never attempts to make any progress. We can have aggressive progress or we can have inanimation under restrictive governmental standards.

Research and Better Nutrition

During the war we submitted to a multitude of government controls in the interest of coordination and implementation of the war effort but for the most part the building blocks that were fitted into the war pattern were those fashioned by research and industry long before the war. Possibly as a result of this, we have developed a positive genius for trying to solve every kind of problem by creating a new control directed from Washington. Complex problems are solved by patient, laborious study and experimentation by a number of different investigators often located in different parts of the country. Seldom, if ever, do any major scientific developments spring full blown from a single laboratory. The problem of better nutrition for America is complex. It depends on all the scientific information we can get from all the research men willing to work on it. Industry

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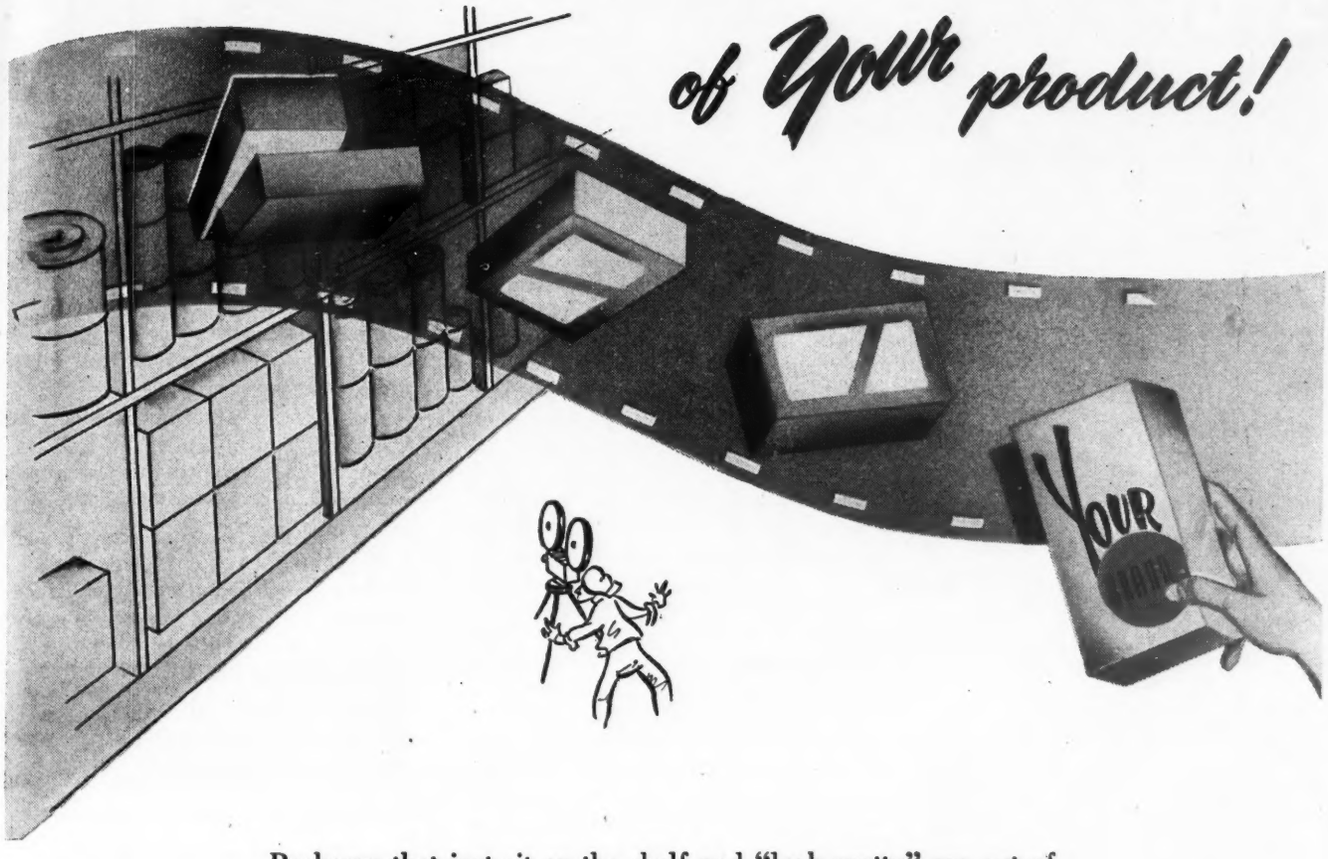
must be able to try one development or another, discarding those which fail. Out of countless trials, errors and failures eventually a new and better level of food stuffs will emerge unless trials, errors, and failures are prevented by the adoption of federal standards. In that case we can all manufacture products according to a federal definition, secure in the knowledge that no competitor can get ahead of us. If any one is rash enough to spend his time and money in making a better product he must tell us about it at a public hearing. If it is really good and new standards are set up we can follow along and reap the benefit of our competitors' research. It is claimed these definitions are set up to promote honesty and fair dealing in the interest of the consumer. There were those in 1905 who thought the public interest could be protected by denying the use of the public highways to the horseless carriage. Certainly speeds in excess of five miles per hour were inimical to the public safety. Going back still further, we can find those interested in protecting the public health demanding that the construction of bath tubs be prohibited. Probably the idea was that someone might catch cold if he took a bath in the winter time. A lot of people fall and hurt themselves in bath tubs and thousands are killed in motor accidents but we didn't set standards of identity for tubs in 1850 nor for motor cars in 1905. Better foods for the future depend upon nutrition research and studies in consumer acceptance of new foods, no less than progress in the airplane industry depends upon the same elements. The latter is given free reign to develop. Is the food industry any less capable of self management?

Standards for Other Products?

Apathy toward this problem exists in some quarters of the food industry because of the belief that, "It Can't Happen Here," or that at the worst, standards will only extend to a few basic products. If this is your attitude you should read Bulletin 110 (1944) of the National Research Council. On page 103 appears this statement, "The possibility may arise that such breakfast cereals (wheat, corn, rice flakes, etc.) may come up for consideration for the adoption of definitions and standards ——. In that case the Food and Nutrition Board will be faced with its previous resolution of October 1, 1941, limiting its advocacy of enrichment to certain staples —— (Farina) is often classed as a breakfast cereal and the adoption of a defini-

make a MOVING PICTURE *of Your product!*



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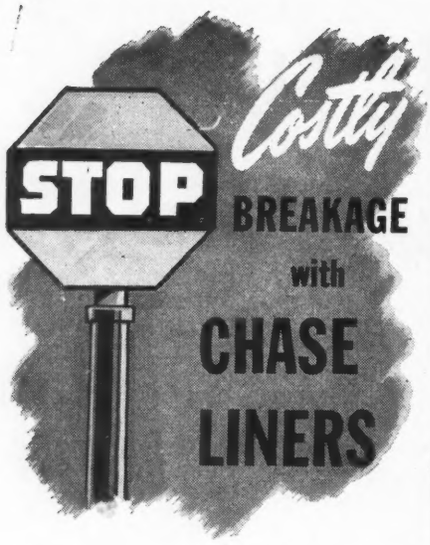
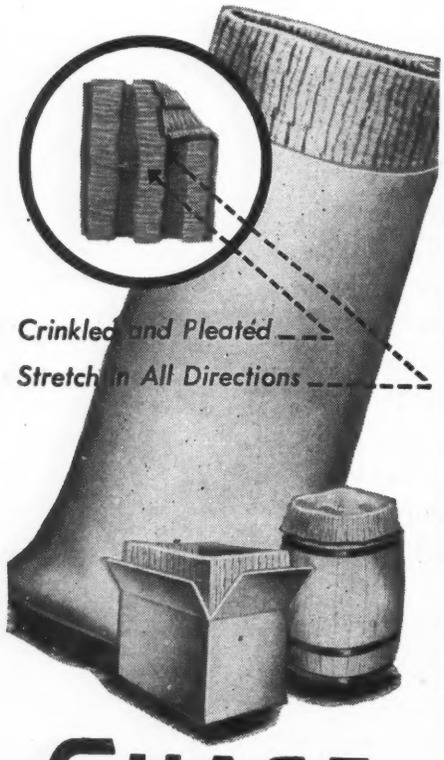


Chase Liners are crinkled and pleated. They're flexible, elastic — stretch in all directions. Provide greater protection, stop costly liner breakage. Check on Chase Liners today — it's the better product that costs no more than ordinary liners.



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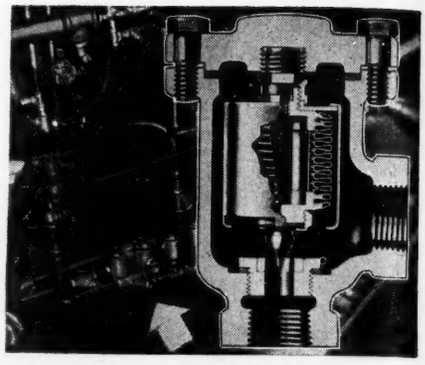
tion for enriched farina may stand as a future embarrassing precedent." If standards of identity for corn meal in the South are necessary why not standards of identity for corn flakes in the North? It is probable that more tonnage of corn flakes moves in interstate commerce than corn meal. Further, one cannot be sure that the views of the National Research Council will always prevail or that they may not change.

Position of the NRC

This brings up the position of the National Research Council in the field of federal standards. Anyone interested in this should read the bulletin mentioned above. This gives an excellent view of the relationship of this organization and the Federal Security Agency. Many times, and possibly always, before the FSA issues a call for public hearings on a food standard, it consults the NRC. The views of the NRC apparently have great weight with the administrator. This brings up a very interesting question. If support or nonsupport of a food standard by NRC means acceptance or rejection of such standard by the FSA then public hearings are just so much window dressing. If the views of the NRC carry profound but not overwhelming weight with FSA then possibly industry should seek ways and means for getting its views before the NRC. This council has on its various committees and boards many of the outstanding scientists of America and its views on scientific research matters should be valuable and worthwhile. In the case of food standards, however, it is not merely a theoretical matter of what is or what is not a good diet. What the public eats is a complex matter involving psychology, availability, economics, personal and regional prejudices and other factors. On such matters the views of industry are probably more valid and more soundly based than those of the scientists on the NRC boards. A scientist is no more qualified as an expert on what constitutes honesty and fair dealing in the interests of a consumer than is a lawyer, an economist, an advertising man or a food manufacturer.

Enough has been said on this subject to indicate its seriousness to the future of the entire food industry and to the future of the American dietary as well. At the production show and conference, sponsored by the Chicago Technical Societies Council, March 20 to 22, there was a panel discussion on the subject, "The Significance of the Trend Toward Federal Standards of Identity for



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The new No. 9 will operate almost as fast as a bucket trap—but have full capacity at condensate temperatures within 20 degrees of the steam. It is

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The illustrations show the PALLETIER at work in a great American university. Here it is used by the engineering department for educational purposes and also on the campus for general materials handling.

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There was shown the full line of MIKRO-PULVERIZERS—from the small Bantam, to the larger production units. Also displayed was the Paddle Feed MIKRO-PULVERIZER for wet filter cake and heavy paste materials—the new Pre-Crusher for breaking large lumps of filter cake—and the Rotary Air Lock, or continuous unloading valve.

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Food Products." Additional discussions should be held. Are the implications inherent in federal standards sufficiently important that the food industry should find a common ground upon which these implications may be objectively examined? Is there a common ground upon which the food industry can meet with nutritionists, public health officials, the NRC and FSA? Should we all write our Congressmen?

This problem affects the public and the food manufacturers more directly than any other group but the initiative toward standards has most often been with nutritionists. If the problem is as fundamental as many feel, then manufacturers from the cereal, canning, packing, and confectionery industries should seek some common ground of action.

References

1. Preface, Bulletin 110, National Research Council, 1944.
2. W. A. Krehl, P. S. Sarma, L. J. Tepley and C. A. Elvehjem, *Journal of Nutrition*, 31, p. 85, 1946.
3. Series of League of Nations Publications, Geneva, 33-4, 1937.
4. Preface to "The Food Industries Contribution to Public Health Through Independent Research," The Nutrition Foundation, N. Y., 1943.

—End—

Materials Handling

(*Continued from page* 80)

DON'T have a preconceived idea as to what conveyor to use or what to convey. Maybe you will want to convey several raw materials to a more advantageous processing point rather than convey a finished material. Always try to convey that which is easiest and can stand the most handling.

DO consider all points where remote controls are desirable. Then, place these controls at all points. Nothing upsets an otherwise well-designed system more than being unable to control it without gymnastics or to control it at all.

DON'T economize on controls, especially automatic ones. Even if the chance of being called into play is remote, make sure you have properly evaluated cost in time and damage by failure to control.

These are by no means all the factors to observe in developing a new or improving an old materials handling system. They are even homely ones, but they are factors that have been, at least in part, overlooked many times. The principal point they make, however, is approaching the problem with a plan. Not an inflexible plan, but one in which every factor has been considered. The "bright ideas" have their place. A carefully thought-out plan is, in itself, so brilliant that "bright ideas" will be found in it. These, however, will not stand out, due to the whole project's brilliance. They will be the natural consequence of the "engineering approach."

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We are not as old as the proverbial hills but . . . we feel that almost half a century in the metal container field has given us the right to "crow" a little.

Down through the years *NATIONAL CAN* has been serving can users in every field, and we are proud of the fact that they depend upon our experience and facilities to supply their needs.

To our broad background of experience we add an unfailingly helpful and dependable service all along the line.

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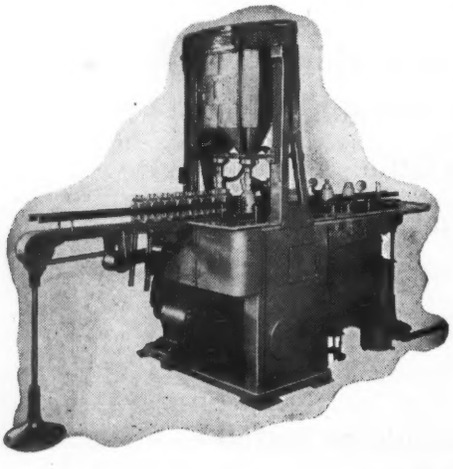
Any powders requiring some packing to fill a tin, glass, fibre or other air-tight container, can be handled quickly, more accurately and with a minimum of waste by the "Auger-Vac," a combination auger-vacuum system.

The auger feed fills the desired amount of material with speed and accuracy; the vacuum method eliminates dust.

"Auger-Vac" method is available for use on the Stokes & Smith Single Unit machine (illustrated above) as well as on the various types of our HG-84 Duplex Heavy Duty Machine (shown at left).



We are unable to turn out machines fast enough to keep up with the current demand, however this would be an opportune time to consult Stokes & Smith engineers about the "Auger-Vac" adapted to the solution of *your* particular problems. Write today . . . no obligation.

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Bottle Washing

(*Continued from page* 103)

Chlorine gas and hypochlorite are two common sources of chlorine for sterilizing bottles. Some washers are equipped with the necessary diffusing apparatus to use gaseous chlorine, which comes in cylinders under pressure. This is probably the cheapest source, but it is difficult to handle and danger from leaks is always present.

The second and most common source is the hypochlorite. Sodium hypochlorite is preferable to the calcium form because of its greater solubility and its inhibiting effect upon scale formation in the compartment and jets. Several reliable firms are now supplying a rather stable 10 to 12 percent sodium hypochlorite. Most bottle washers are equipped with the necessary injecting devices for chlorine water in the concentration required by the health officials.

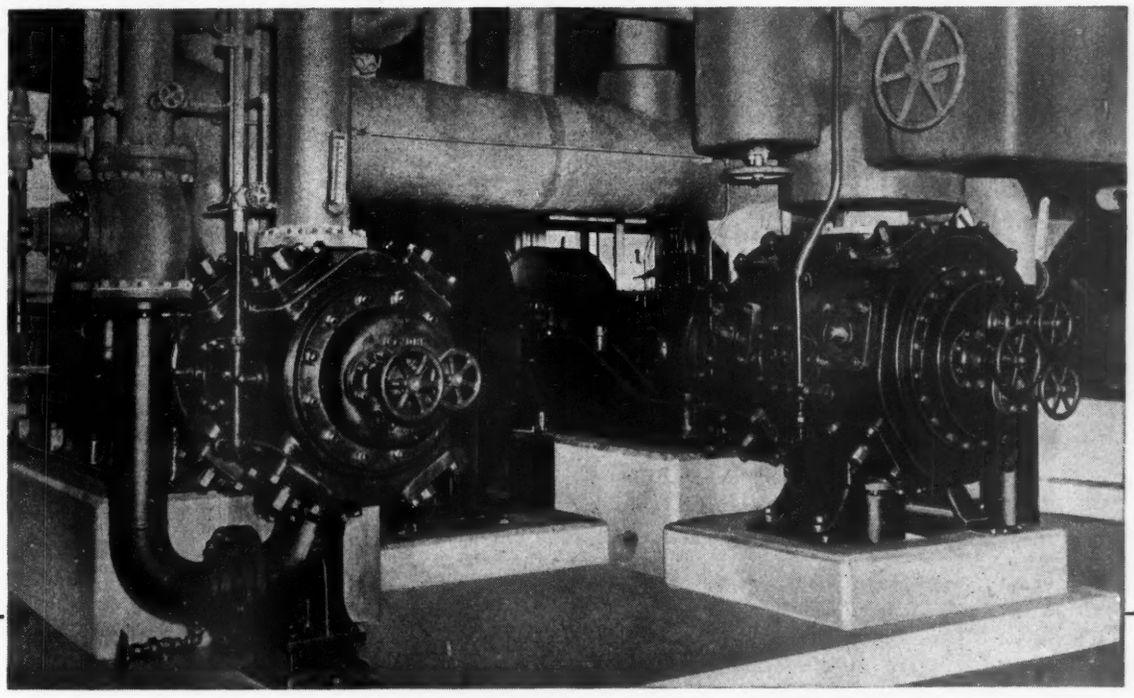
Cost Reduced

A measure of the need for a study of the bottle washing operation is found in the cost record of one Midwest milk bottling plant, which had an average amount of washing difficulty. From December, 1939, through March, 1942, approximately 300,000 bottles were washed per month on a machine in fair, but average, condition. Shown in Table I is the actual cost of the alkali divided by the number of bottled items. Broken or rejected bottles are not included.

It may be noted from this record that in February, 1940, 2,229 lb. of alkali and 152 lb. of treatment were used in the bottle washer, at a cost of $130. The machine was badly scaled up, indicating that the treatment was not satisfactory. Another test of the same brand of alkali was made later with proper supervision after an operation study had been made. The result was that in March, 1942, the total cost of washing solution in this plant was $19.53—a saving of over $110 per month. Furthermore, the machine was doing a much better job, with little scale formation, and was certainly delivering more satisfactory bottles.

This cost record shows that proper supervision and operation studies are necessary and that any incidental additional expense will more than pay for itself. Further study in this plant proved that almost any of the better-known alkalies will do a good job if they are used properly. Considerable operation study is required to decide which compound will do the most economical job in a particular plant. Experience in this

WHEN HEAVY DUTY DOES DOUBLE DUTY



Real huskies, these Worthington Heavy Duty Compressors . . . built to "put the pressure on" in a big way . . . to deliver economical, trouble-free refrigeration — and lots of it—year after year, under toughest conditions.

And versatile! *Double suction* can be built into the standard design, enabling maintenance of two different temperatures in different parts of the plant — *at the same time*. Or, a single, over-all temperature can be maintained with the same unit, if required.

Worthington Compressors are the horizontal duplex type, motor-driven with hp's up to 1500. Smooth, balanced operation is assured by force-feed lubrication and adjustable bearings throughout, and by Worthington's Automatic Variable Capacity Control — an exclusive feature for positive, flexible pressure regulation. And, like all Worthington compressors, they provide a sure, steady gas-flow through the famous Feather* Valve — the lightest, simplest, most efficient compressor valve ever made.

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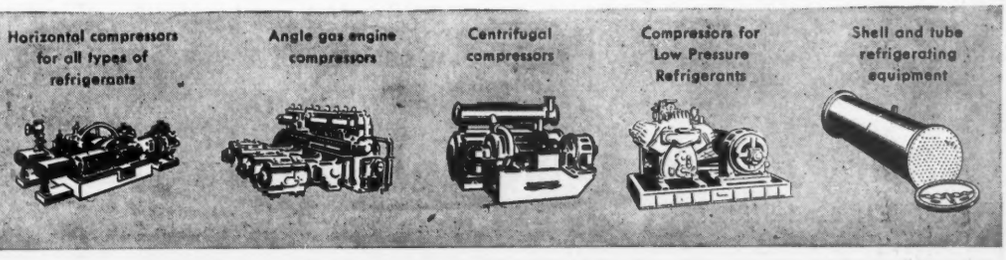
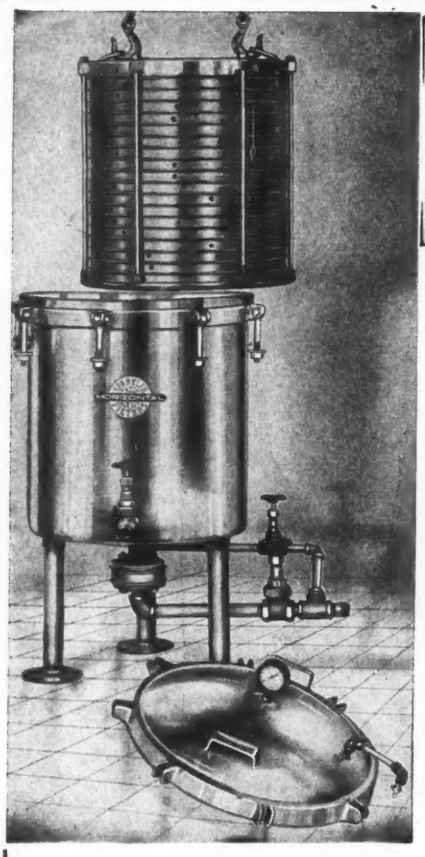

Horizontal compressors for all types of refrigerants
Angle gas engine compressors
Centrifugal compressors
Compressors for Low Pressure Refrigerants
Shell and tube refrigerating equipment



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plant also taught that water conditioning is cheaper than scale removal and that a washer with little scale will do a better washing job for less money than will one in which scale is permitted to form.

Only a clean, well cared-for machine, manned by a competent, well-trained operator can deliver bottles that are suitable for filling with a high quality product. Knowledge of bottle-washing technic is increasing daily, but much more remains to be learned about this phase of plant operation. A few hours spent studying the bottle-washing problem and the application of available tested practices to obtain fully cleaned, properly rinsed and sterilized glass containers will repay the effort with interest.

—End—

German Chocolate

(*Continued from page* 89)

ers in essential war industries. As far as we know it was not necessary to use any displaced persons or slave labor in any chocolate plants. Women took over a great deal of the work in the plants that continued to operate, and I do not recall seeing many young people in the plants that I visited. Supervisory personnel, of course, was reduced to the very minimum.

In the Russian area of occupation there will be a shortage of technical staffs in some of the more important industries such as chemicals and machinery. There is even evidence that some of the important personnel from chocolate plants may have been taken eastward into other parts of the Russian area. As far as I know there has not been any such evacuation of personnel from the plants in the American and British zones.

Berlin and Dresden

You may be wondering why so far I have not mentioned Berlin and Dresden. Berlin represented the center of chocolate products manufacture, while Dresden could be taken as the center of chocolate and confectionery machinery production. Both cities were in the Russian area of conquest. Both were so badly bombed that not until about mid-July did Berlin become accessible to industrial intelligence observers of American or British armies. As for Dresden, there have been no such non-Russian observers of my acquaintance. Billeting, transportation and food supplies presented such enormous problems that it was

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impossible for me to get into Berlin before my assignment was ended.

I am, therefore, unable to speak from any personal observation of such plants as Trumpf, Sarotti, Hildebrandt or the old Venetia plant in Berlin. A scientific consultant who was in Berlin in early August, knowing that I was interested in such targets, told me that the majority of the Sarotti plant had been dismantled and was no longer in Berlin. A portion of it was allowed to remain to grind wheat and rye flour. The milk plant, which I believe is a Nestle subsidiary, was making baby food entirely and was operating under Russian orders.

As for Dresden, only the most meager details can be related. Those areas in which are located many of the chocolate and confectionery machine manufacturers are completely destroyed, if my informants were correct. It has not been possible for me to verify some of the fantastic stories of destruction and bombing both by American and British airmen and Russian artillery, but judging from the accounts it would appear that the story of Dresden will make some of the stories of Cologne and Berlin mild by comparison.

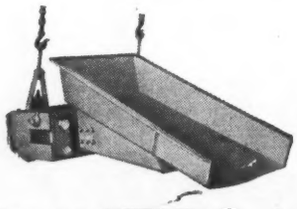
German rail, canal and highway service gradually broke down. Even had there been sufficient cocoa beans and supplies of other ingredients to keep the confectionery and chocolate plants operating it would have been practically impossible to transport the product. Nearly every canal-boat in Germany ultimately was locked in short sections of rivers and canals by bridges demolished in raids. It took almost three months for the British to get the principal rail line from Belgium through their occupation zone into Berlin open for service. It will be years before the detouring and rerouting of rail service ends. Transportation for our teams was by air and military motor vehicles.

Industry Overrated

It seems that the German industry has enjoyed a reputation far out of proportion to its merits. I saw it in its most unfortunate state of collapse when some of the plants looked like deserted villages. There were only three or four plants that supported a testing laboratory, and practically no research work was being conducted by the industry on a par with that carried on here in America. There was no process to make non-bloom chocolate. We must conclude that the German reputation for prewar quality is merited by them but their quantity production, scientific operation, and production efficiency were very much overrated. American manufacturers can feel that their methods are as good as, and in most cases better than, any found in Germany.

—End—

Controlled Process Feeding with



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Enzyme Activity

(*Continued from page* 114)

to cover) and 1 ml. each of 1-percent guaiacol and 0.5-percent hydrogen peroxide solution. It is important that these relative peroxide and guaiacol proportions should be maintained; therefore measure them with a graduated pipette. If droppers are used, the number of drops to 1 ml. should be determined for both the guaiacol and peroxidase solution. As one is in alcohol and the other in water, the drop sizes will not be identical.

4. After adding the solutions to the vegetable shake the test tube to mix them, and allow to stand. Note the reaction after 2 and 5 minutes.

5. A reddish brown discoloration, particularly when it is intensive, is recorded as "positive" and no discoloration as "negative." The degree of reaction is an indication of the activity of peroxidase.

Negative—no change.

Trace—reddish brown specks or a few larger spots especially on veins.

Light positive — light brown markings scattered through the tissue or heavy browning of a few pieces. Not restricted to veins.

Positive—any stronger reaction.

Both negatives and trace reactions may be regarded as satisfactory evidence of effective scalding.

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—End—

Prepackaged Meats

(*Continued from page* 97)

Summary

The extent to which meat packers will prefabricate and prepackage meats will, in the final analysis, be determined largely by the preferences of the consumer. Due to the war, OPA restrictions and regulations and shortages of meat, the packers were unable to conduct research to ascertain the consumer's preference for fresh or frozen meats. Conditions have been too artificial and abnormal to carry on such tests. The real answer to the consumer's preference for fresh or frozen meats will come only when she can select on the basis of appearance, taste, price and convenience. Until then, forecasts would be on the basis of wishful thinking or inconclusive tests based on artificial consumer reactions under abnormal conditions.

Packers will have to sell prepackaged quick frozen meats at a higher cost. Correspondingly, the cost of the product to the retailer must go up. Selling expense, on the other hand, would be considerably lower than with fresh meats. It is questionable whether the decrease in retail selling expense will compensate for the cost of the products to the retailer. It is our opinion that the ultimate success of prepackaged quick frozen meats may in final analysis depend to a large extent on whether the sum total of all costs can be so adjusted that the final price to the consumer is not too greatly out of line with her cost of comparable fresh product.

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